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UNIVERSITY OF ALBERTA

ANALYSIS AND EVALUATION OF NEPHROLOGY NURSING RESEARCH LITERATURE: 1990 - 1992

BY

© GAIL WILKINSON

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Nursing

FACULTY OF NURSING

EDMONTON, ALBERTA
SPRING 1995

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May 18, 1992

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Dear Ms. Wilkinson:

This letter is to confirm our telephone conversation of last week during which I gave you permission to use the Research Appraisal Checklist as an instrument in your Masters research project: **An Evaluation of the Nephrology Nursing Literature.** It was a distinct pleasure to talk with you about your research project. I have enclosed a copy of the article I mentioned on the phone.

Best wishes in your proposed project. Please let me know if I can be of any more assistance.

Sincerely:

Mary E. Duffy

Mary E. Duffy, Ph.D., R.N.
Professor & Chair
Division of Nursing Theory,
Research & System Support

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Date: April 20, 1995.

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "ANALYSIS AND EVALUATION OF NEPHROLOGY NURSING RESEARCH LITERATURE: 1990 - 1992 submitted by GAIL WILKINSON in partial fulfillment of the requirements for the degree of MASTER OF NURSING.

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ABSTRACT

One of the goals for nursing research is that the results be used by nurses. To use research, nurses must first identify available research reports and then decide whether they are appropriate and suitable. The purpose of this study was to describe and evaluate the quality of nephrology nursing research published between 1990 and 1992. A total of 194 research reports met the inclusion criteria for this study. Classification by research design was as follows: 46% evaluative; 22% epidemiological ; 20% survey; 11% exploratory- descriptive; 1% methodological; and 0.5% experimental. Of the 194 studies, 42.3% pertained to peritoneal dialysis, 29.4% to hemodialysis, 18.0% to renal transplantation, 7.2% to end-stage renal disease in general, and 3.1% to acute renal failure in general. The most frequent research topics of research were: pediatrics, erythropoietin, mortality/morbidity, peritoneal dialysis (PD) complications, peritonitis, and quality of life. The most frequent independent variables referred to medication administration, dialysis system/modality, and erythropoietin. The most frequent dependent variables pertained to biochemical parameters, physical/physiological parameters, peritonitis, PD complications, and comorbid disease. Of 185 studies with quantitative data collection techniques, 90.8% were classified as average, 8.6% were below average, and 1.9% were superior. Reliability and validity calculations showed acceptable content validity for the "Research Classification Instrument" (RCI), but unacceptable initial interrater and intra rater reliabilities for classifications of: research design, identification of independent variables, and identification of dependent variables. Data collection was repeated for

these variables to ensure adequate consistency of ratings. The "Research Appraisal Checklist" (RAC) demonstrated excellent stability and consistency of classification, however decision validity was low. This project provided both a mechanism to identify existing nephrology nursing research literature, and a basis for the determination of "usability" for the research findings. Thus, nurses can more readily incorporate research into nursing practice. The results of this project will also assist researchers in determining program directions for research. Educators will benefit from such research as it facilitates dissemination of the best quality research.

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TABLE OF CONTENTS

Chapter Page

I. INTRODUCTION 1

Statement of the Problem 1
Purpose of the Study 4
Definition of Terms 5
    Analysis of Published Nephrology Nursing Research 5
    Research Design Taxonomy 5
    Clinical Area of Practice 6
    Major Topic of Research 9
    Independent Variable 9
    Dependent Variable 9
    Quality of Research 9
Summary 10

II. LITERATURE REVIEW 12

Description and Analysis of Research Literature 12
    Overviews or Surveys 12
    Analysis of Research 13
    Meta-analysis 15
Evaluation of Quality of Research 16
    Research Review 17
    Research Critique 17
    Evaluation of Research 19
Research Appraisal Checklist 21
Analysis and Evaluation of Nephrology Nursing Research
    Literature 26
Formulation of the Research Questions 26
Summary 28

III METHODS 29

Research Design 29
Sample 30
    Description of the Population 30
    Sampling Methods 32
        Sample Item Identification 34
        Research Article Retrieval 37

Chapter Page

Description of the Study Sample 38
Instruments 38
Analysis of Nephrology Nursing Research 39
Content Validity 39
Reliability Testing 40
Stability of the Instrument 40
Rater Reliability's 43
Evaluation of Nephrology Nursing Research 47
Construct Validity 48
Reliability Testing 52
Training 54
Data Collection 54
Data Analysis 55
Ethical Considerations 57
Summary 57

IV. RESULTS 59

Description of the Total Sample 59
Research Design 61
Clinical Area of Practice 61
Major Topic of Research 64
Independent Variable 67
Dependent Variable 67
Quality of Research 75
Quality of Research of the Total Sample 75
Common Problems in Research Methodology and Presentation 79
Summary 79

V. DISCUSSION AND CONCLUSIONS 82

Discussion 82
Findings in Relation to the Research Problem 82
Findings in Relation to the Literature Review 84
Findings in Relation to Previous Research 87
Research Design 87
Clinical Area of Practice 88
Major Topic of the Research 89
Independent Variable 91
Dependent Variable 92
Quality of Research 94

Chapter Page

Common Problems in the Research 96
General Discussion of Research Findings 99
Limitations of the Study 100
Implications for Nursing Practice 102
Implications for Nursing Research 102
Conclusions 104

References 105

APPENDIX A 110

APPENDIX B 112

APPENDIX C 114

APPENDIX D 116

APPENDIX E 123

APPENDIX F 128

APPENDIX G 134

APPENDIX H 167

LIST OF TABLES

Table Page

1.1 Description of research design taxonomy 7

2.1 Blueprint for Research Appraisal Checklist 24

3.1 Inclusion Criteria for the Study Sample 33

3.2 Journals examined for research article identification 36

3.3 Stability calculations for the "Research Classification Instrument" . . 41

3.4 Interrater reliability calculations for the "Research Appraisal Checklist" 44

3.5 Intrarater reliability calculations for the "Research Appraisal Checklist" 45

3.6 Test result matrix - decision validity for the "Research Appraisal Checklist" 49

3.7 Results of rater reliability testing for the "Research Appraisal Checklist" 53

4.1 Descriptor categories for the variable "topic area of research", and the frequency and percentage of research items classified for each category 69

4.2 Descriptor categories for "independent variable", and the frequency and percentage of research items classified for each category 71

4.3 Descriptor categories for "dependent variable", and the proportions of research items classified for each category 72

4.4 Percentage of research items classified for "quality of research"; for the total sample (n=185), and for each of the years: 1990, 1991, and 1992 77

4.5 Percentage of research items classified as "below average", "average", and "superior for both the total RAC, and the RAC categories 80

LIST OF FIGURES

Figure — Page

4.1 The percentage of nephrology nursing research literature (n=194) published in each of the years 1990, 1991, and 1992 60

4.2 The percentage of research items (n=194) classified for each research design category 62

4.3 The frequencies of classification of research items for the variable "research design" for each of the years 1990, 1991, and 1992 63

4.4 The percentage of research items (n=194) classified for each category of clinical area of nephrology nursing practice 65

4.5 The frequencies of classification of research items for the variable "clinical area of practice" for each of the years 1990, 1991, and 1992 66

4.6 Distribution of RAC scores (uncorrected for N/A items) for the total sample (n=185), and for each of the years 1990, 1991, and 1992 . . . 76

4.7 Percentage of research items (n=185) classified for each of the "quality of research" categories 78

I. INTRODUCTION

Nephrology nursing is a specialty area of nursing that encompasses a variety of clinical situations, ranging from conservative care of individuals with renal disease, through dialysis treatment modalities, to kidney transplantation. Nephrology nursing research is published in numerous nursing journals, including journals specific to nephrology nursing. From the perspective of identifying and describing the nephrology nursing research published in 1990 through 1992, published research reports were analyzed using five descriptive variables and evaluated for quality of research. This process resulted in descriptions of both individual research items, as well as the body of published research.

Statement of the Problem

The continuing evolution of nursing as a profession includes the development of a body of knowledge unique to nursing. Each specialty area within nursing has a unique body of knowledge which contributes to nursing knowledge as a whole. The incorporation of nursing knowledge into practice requires the testing and validation of this knowledge in the nursing practice setting. This can only be done through research (Fawcett, 1983). Therefore, nursing practice that incorporates nursing knowledge is by necessity research based. Thus, one of the goals for nursing research is that the results be used by nurses. To use the findings of research, nurses must be able to decide whether the findings are appropriate and suitable. This process of determining usefulness of research results and conclusions has two major componants: identification of research studies and evaluation of research findings.

The establishment of research-based nursing practice requires that nurses know what research has been conducted in a particular area of interest. With research reports published in a variety of journals, it becomes increasingly difficult for nurses to both find published research, and maintain an up-to-date knowledge base of research findings. It is equally important to identify subject areas where little, or no research exists. An analysis of existing research using descriptive variables provides a meaningful way to identify the presence or absence of useful research reports.

A research report must be evaluated to determine the quality of both the research process and the subsequent research findings. In this study the research process refers to the "steps" or componants of the conduct of research. Examples of these componants are the formulation of research questions, literature review, research design, sampling methods, and statistical analysis. Furthermore, results of research must be considered in relation to the existing body of knowledge in the particular topic area of the research. The determination of quality of a research study serves as the basis for the synthesis of research findings, and is therefore an integral part of deciding "usability" of research findings.

The analysis and evaluation of nephrology nursing research literature that is presented in this study provides both a mechanism for the identification of existing research published in 1990 through 1992, and a basis for the determination of "usability" of the research findings. The items in the study sample were identified through a comprehensive search strategy; therefore the sample represented the majority of published research reports for the time period in question. The variables used to describe the research items allowed for the identification of similarities and dissimilarities between the individual reports. The project findings contain a reference listing which identifies the source of the individual research reports. Therefore, the findings of this project represent a database that nurses can utilize to determine what, if any, research has been done for particular areas of interest. Utilization of the findings of this project to identify existing research will thus facilitate research-based nursing practice.

The evaluation of each research report for quality of research provided both a rating of the adequacy of the research process, and identification of problem areas within the research process. Therefore, these quality determinations serve as a guide for nurses when they are considering the findings of a research report in relation to existing knowledge. As such, the evaluation of quality of research assists in determining the "usability" of the research findings.

In addition to promoting the development of research-based nursing practice, the results of this project will also assist researchers in deciding program directions for research. Through identification of existing research studies, researchers can review what is known about a problem. The description of the body of published research provides information about what research problems were deemed important by the "community" of nephrology nurse researchers. Commonalties in both research methods, and problems in the conduct of research can be deduced. Thus, the results of this project will assist researchers to plan future projects.

Educators will benefit from this analysis and evaluation of nephrology nursing research results of this project as it facilitates the dissemination of the best quality research. It is essential that nursing education curricula contain accurate and up-to-date knowledge. This can only be achieved through reviewing current research, and disseminating valid research findings. Thus, nurse educators must identify and evaluate research reports for "usability" in much the same manner as for nursing practice. The findings of this project will assist nurse educators in the identification and evaluation process.

Purpose of the Study

The purpose of this study was to analyze in descriptive terms, nephrology nursing research that was published in 1990 through 1992. The analysis is a description of individual research reports and a subsequent description of the entire body of research reports using the following variables: research design, clinical area of practice, major topic of research, independent variables, and dependent variables. Furthermore, the research utilizing quantitative data analysis was evaluated and given a quality rating. The specific research questions for the analysis of the published items were:

1. What type of research design was employed in the study?

2. Within the context of nephrology nursing, what was the clinical area of practice addressed by the research study?
3. What was the major topic area of the research?
4. What were the independent variables in the research?
5. What were the dependent variables in the research?

Research questions in relation to evaluation of the quantitative items were:

1. What was the quality of the published nephrology nursing research literature?
2. What were the most common problems in the methodology and presentation of the research?

Definition of Terms

Analysis of Published Nephrology Nursing Research

The analysis is a description of the body of research reports based on the collection of data and statistical analysis of the following variables: research design, clinical area of practice, major topic of research, independent variables, and dependent variables. The analysis utilizes an exploratory-descriptive research design. The study population was nephrology nursing research literature published in 1990 through 1992.

Research Design Taxonomy

The research design taxonomy used in this study consists of seven categories based on those outlined by Brink and Wood (1989). These categories consist of three major groups which classify research design based on knowledge about the study variables and the degree of control over those variables that can be achieved. There are four additional design categories which tend to be "mixed" in nature; that is, they do not meet all of the criteria for one of the three major categories or they are designed to answer a specific type of research question. See Table 1.1 for a description of the research design categories.

Clinical Area of Practice

Within the realm of nephrology nursing there are five areas of practice:

1. Nursing practice related to hemodialysis.

   Nursing practice related to hemodialysis incorporates a large technical component associated with providing and monitoring hemodialysis treatments. The technical aspects of treatment and complications of the treatment result in a body of nursing research unique to this area of nephrology nursing.

2. Nursing practice related to peritoneal dialysis.

   Nursing practice related to peritoneal dialysis is involved with the technical aspects and monitoring of peritoneal dialysis treatments. The treatment, complications, and issues surrounding peritoneal dialysis are different from those related to hemodialysis, thus resulting in a body of nursing research unique to this specific treatment modality.

Table 1.1.

Description of research design taxonomy.

RESEARCH DESIGN CATEGORY	DESCRIPTION
1. Experimental design	Where the research is designed to **test theory**. This includes the experimental design where there is random assignment of subjects to groups, manipulation of independent variable(s), control of intervening variables, quantitative data collection, and data analysis which discriminates between and among experimental and control groups. Also included is the quasi-experimental design where random assignment of subjects does not occur (Brink & Wood, 1989, pp. 19-20).
2. Survey design	Where the research is designed to yield a statistical analysis of the **relationships between and among variables**. This includes comparative designs, where a cause-and-effect relationship is predicted, but there is no manipulation of the independent variable. This category also includes correlational designs where there is no prediction of cause and effect (Brink & Wood, 1989, pp. 20-21).
3. Exploratory-descriptive design	Descriptive design is used to **describe a single variable or population** in a thorough manner. Usually involves both qualitative and quantitative data collection techniques. Exploratory designs are used to define concepts, describe processes or result in beginning theories. Usually have qualitative data collection (Brink & Wood, 1989, p 21).
4. Historical design	Is nonexperimental, based on available written data, artifacts, or oral histories. Usually qualitative data (Brink & Wood, 1989, p 22).
5. Epidemiological design	To **document health, illness and disease patterns**. Are usually correlational designs (Brink & Wood, 1989, p 22).
6. Methodological design	Used to **develop and test data collection instruments** (Brink & Wood, 1989, p 23).
7. Evaluative designs	Describing **a change or manipulation and testing the effect** (Brink & Wood, 1989, pp. 22-23).

3. Nursing practice related to renal transplantation.

The nursing care of patients with renal transplants is less directed toward technical treatments. The focus is primarily assessment and evaluation of patient's functioning after transplantation. The body of nursing research related to patients with renal transplants is unique for this aspect of nephrology nursing.

4. Nursing practice related to end-stage renal disease in general.

This category of nephrology nursing research addresses questions and issues that are common for all patients with chronic renal failure. The research may include questions pertaining either to patients who have not yet started dialysis, or to issues common to patients on both hemodialysis and peritoneal dialysis.

5. Nursing practice related to acute renal failure in general.

The nursing care of patients with acute renal failure is primarily, but not exclusively involved with nursing in intensive care settings. The dialysis techniques tend to be complicated or modified because of the patients' general condition. Thus research questions related to this type of nephrology nursing are unique.

Major Topic of Research

This is the specific area of inquiry of a research study i.e.. sleep disorders, blood pressure control, or sexuality.

Independent Variable

This is the manipulated or causative variable in a research study.

Dependent Variable

This is the outcome or measured variable in a research study.

Quality of Research

In this research project the concept of quality of research was viewed in the context of utilization of research findings. Nurses need a method to determine the appropriateness and suitability of research findings. The concept of quality of research is viewed as one component in this determination. For this study quality of research was defined as the degree of credibility attributed to the **research process**. The determination of "usability" of research consists of further evaluation of the credibility and value of the **research findings**. The three concepts: quality of research (credibility of the research process), credibility of the research findings, and value of the research findings are related in such a way that the credibility and value of research findings are derived in part from the credibility of the research process.

Credibility of the research process (quality of research) refers to the degree to which the research process is deemed to be adequate by the scientific community. Adequacy of the research process includes, but is not limited to, the areas of theoretical justification for the research, the reliability and validity of both the research design and measurement instruments, the methods of statistical analysis, and the reporting of the research findings. Credibility of the research findings is directly derived from the degree of credibility of the research process. Value of the research findings is the degree of significance of the findings within the broader context of the existing body of knowledge about the research subject.

The process of determining quality of research requires that observable phenomena be evaluated. In this study, the published reports of research studies served as the objects for evaluation. Quality of research was operationally defined as: given the standards defined by Duffy (1988) relating to the conduct and communication of research, a rating of quality of research can be obtained for a research report.

Summary

The utilization of research findings requires that a determination of "usability" be made for research findings. Essential componants of this determination include the identification of existing research, and the evaluation of quality of the research. The purpose of this study was to analyze in descriptive terms, nephrology nursing research that was published in 1990 through 1992, and to evaluate the quality of reasearch. The analysis utilized the following variables: research design, clinical area of practice, topic of the research, independent variables, and dependent variables. Evaluation of quality of research addressed both determinations of research quality, and identification of common problems within the body of research reports.

II. LITERATURE REVIEW

Research can be described or analyzed in different ways. In this literature review, analysis as a distinct form of "research about research", will be presented in relation to surveys or overviews of research and meta-analysis. This will place research analysis in context with how others look at research. Quality of research will be discussed in relation to the concepts of research reviews, research critiques, and research evaluations. Literature pertaining to the "Research Appraisal Checklist" will be discussed. Finally, previous research about nephrology nursing research literature will be described.

Description and Analysis of Research Literature

Overviews or Surveys.

Several authors have published overviews, or surveys, of nursing research. An overview consists of descriptive categories containing statements about published research studies. Abdellah (1970a, 1970b, 1970c) categorizes 175 nursing research projects and then proceeds to describe each. She makes generalized statements about gaps in research and recommendations for future research. Gortner and Nahm (1977) look at published nursing research from a historical perspective. They present a brief history of nursing in the United States, then describe a variety of nursing research studies conducted through the years. Gunter and Miller (1977) present and discuss published research in the specialty of gerontology, and Gortner, Bloch, and Phillips

(1976) categorize and describe practice-related nursing research. Sills (1977) describes aspects of psychiatric nursing research literature. It is noted that she describes this article as a "review and assessment of research" (p. 201), but then qualifies this by implying that the scope is not as comprehensive as the term review might suggest. The assessment is not in relation to individual research works, but is a series of opinion statements about psychiatric nursing research in general.

Overviews of nursing research are not a form of research. There is usually no methodology to the overview, except perhaps a statement regarding a restriction of articles to a specific nursing specialty, or a selected group of research journals. A description of nursing research articles is the common content in an overview. Descriptions usually include the topic of the research, and occasionally aspects of the research methodology or results. Thus, overviews or surveys tend to be a simple description of a group of research studies which are organized into categories. Often these descriptions are placed into a historical context. Commentary and recommendations about the research studies tend to be the author's opinions rather than based on any objective analysis of the research literature.

Analysis of Research.

An analysis of research literature is a description of a body of published research that utilizes a research methodology. Inclusion criteria are specified, as well as variables upon which the description will be based. Often instruments are developed and tested for use in the analysis study. Conclusions about the research tend to be based on the "group" of studies. Similarities, dissimilarities, or "problem areas" are identified and discussed. The type and number of research studies used in an analysis, and the variables examined, are determined by the questions posed by the individual researchers.

The most common variables used in analyses of research are those related to research methods, including research design, sampling, statistical analysis, theoretical frameworks, and measurement tools. One or more of these variables are found in the analyses of Van Cott, Tittle, Moody, and Wilson (1991); Dilorio (1990); Hermansdorfer, Henry, Moody, and Smyth (1990); Jones and Jones (1989); Lobo and Ross-Alaolmolki (1989); Roberts (1989); Waltz and Strickland (1989); Whall, Booth, and Jirovec (1989); Moody et al. (1988); and Loomis (1985). O'Connell used the variables: medical diagnostic category of subjects, procedures and techniques investigated, specific patient needs, and condition of subjects (1983). Thus, the majority of research analyses relate to variables about how research is conducted. There are limited analyses describing the topics or findings of the sample research items.

The following examples of analyses of research are typical of this method of describing a body of research. O'Connell and Duffy (1978) analyzed nursing practice research on the basis of investigator characteristics, funding sources of the studies, content of the studies, and research methods. They analyzed studies published in Nursing Research, over a specified time frame. Descriptive statistics were used in this analysis, and the summary statements were based on the results. Brown, Tanner, and Padrick (1984) analyzed nursing research reports published in several nursing journals.

Their analysis was based on primary authorship, topic of investigation, theoretical orientation and methodology of research. As in the previous analysis, descriptive statistical analysis provided the basis for the author's discussion and conclusions.

The analysis of selected groups of research appears to be the most common type of published research about other research. This work serves to identify trends and common problem areas in a group of research studies. The use of a research methodology with identified variables serves to differentiate an analysis from an overview of research literature. The analysis of research studies is a form of research, whereas overviews are not.

Meta-analysis.

Meta-analysis integrates research findings through the statistical analysis of a collection of results from research studies with similar research questions (Glass, 1976). This allows for the determination of a single, generalizable finding. Meta-analysis helps integrate findings of multiple primary studies into a body of knowledge by organizing the literature on a specific topic (Smith, 1988). It also assists in the identification of characteristics which influence the cumulative results (McCain & Lynn, 1990).

Concerns have been raised by researchers about meta-analysis as a method of research integration. The studies included in a meta-analysis are rarely a representative sample of existing research. This is a result of the tendency of journals to publish only those studies with positive, significant findings, and difficulties in identifying and retrieving all pertinent studies. Studies of varying quality are usually included in a meta-analysis without controls for the effects of this variance. Thus, studies with comparable sample sizes and of varying validity will contribute equally to the resulting mean effect size (Lynn, 1989; McCain & Lynn; 1990; Smith, 1988).

Glass (1976) argues that poor quality studies may still have valid results and thus quality should not be an issue. He then cites an example where poorly designed studies resulted in positive findings and studies with good designs yielded no effect for a specific research question. It is unclear how Glass determined that the positive findings were valid. In opposition to Glass, it appears that nursing researchers agree that quality of research needs to be controlled for in order to maximize the validity of the findings of the meta-analysis; either within the inclusion criteria or as a variable within the design of the meta-analysis (Lynn, 1989; McCain & Lynn, 1990; Smith, 1989).

Meta-analyis differs from an analysis of research in both purpose and methodology. It is not a description of existing research, but a method of integrating the findings of research. Similar variables may be coded for in both types of analysis i.e. research design or quality of the study, but in meta-analysis these variables serve to identify factors which influence the resulting effect size. Although both analyses and meta-analyses of research are conducted using a research methodology, both the purpose and results are very different.

Evaluation of Quality of Research

In the area of research utilization, several authors discuss the need for an evaluation of the scientific merit of research studies before implementing findings

(Burns & Grove, 1987; Fawcett, 1983: Stettler & Marram, 1976). It is apparent that there is considerable variation of terminology with respect to the entire area of research evaluation. Terms such as review, integrative research review, critique, critical evaluation, evaluation, and critical analysis are all used with varying meanings (Brink & Wood, 1988; Burns & Grove, 1987; Fawcett, 1983; Norbeck, 1979; Woods & Catanzaro, 1988). It thus becomes imperative to delineate a framework of terms and their meanings, in order to understand how this proposed research study relates to them.

Research Review.

The research review is a mechanism for communicating a body of research. The review may be done in order to formulate research questions or to identify what is known about a topic or several topics. It summarizes findings, and identifies strengths, weaknesses, and inconsistencies in the literature. It interprets the literature in relation to existing knowledge. The scope of a review will vary depending upon the purpose of the review (Woods & Catanzaro, 1988).

Research Critique.

A research critique refers to the critical assessment of a single research report. It is a detailed and thorough assessment and evaluation of all aspects of a research study. Thus, a critique of research involves a complex cognitive process. This process of critiquing research has been described in several ways, but common to all descriptions are levels of assessment which involve cognitive skills of increasing complexity (Burns

& Grove, 1987; Norbeck, 1979). Norbeck proposes a theoretical framework for a research critique based on six cognitive domains. The domains of knowledge, comprehension, and application of concepts, terms, and principles are stated as prerequisites for critiquing research.

The cognitive domain of analysis involves the ability to identify elements of the research and to understand their organization and relationships. The domain of synthesis refers to drawing conclusions based on combining elements from many sources. The cognitive domain of evaluation involves using standards to make judgements about the value of a product or idea. Evaluation involves all of the other cognitive domains as well as adding judgement criteria. Internal standards of evaluation are based on the analysis; external standards of evaluation are based on the synthesis (Norbeck, 1979). Therefore, critiquing a research report involves analysis; such as determining consistency between research questions and research design, or recognizing which parts of a discussion support conclusions. Synthesis would include formulating new research questions, or determining how research findings might be used in practice. Evaluation by internal standards involves judgements about the parts and relationships within a research report; evaluation by external standards results in judgements about the conclusions and ideas derived from the research.

The research critique is largely subjective in nature. Thus the quality of the research critique depends on the skills of the individual doing the critique. "How to do" a research critique is discussed in numerous books (Borg & Gall, 1989; Brink & Wood, 1988; Downs & Newman, 1977), and published articles (Jacox & Prescott, 1978;

Norbeck, 1979). These descriptions usually entail a list of what should be contained in a research report, and may also suggest questions to consider when evaluating the report.

Evaluation of research.

Evaluation of research refers to the use of standards or criteria to give a judgement of value to a study. It is evaluation by internal standards. There have been efforts to make this process objective and quantitative. Cole and Cole (1971) proposed that in the area of sociological research, the number of citations an individual receives may be tabulated and used as an indicator of the relative scientific quality of the individual's publications. Quality in this article is defined as significance of an author's research findings to the advancement of knowledge in the discipline. Thus the conceptual basis for evaluation of quality of research is that of a more global measure of a scientist's total work. When addressing the implementation of specific nursing research findings, this method of determination of quality is not appropriate. Additionally, one could argue that the proposed relationship between number of citations and quality of research is not valid. A research study may be cited for reasons other than that the findings are significant. These studies would not advance knowledge in a discipline, but would contribute to a higher quality rating.

Georgopoulos (1975) developed a quality index for evaluating research that was based in the area of hospital organization and management. This instrument consisted of three weighted ratings: substantive relevance, theoretical usefulness, and methodological adequacy. The major limitation of this instrument is that the relevance and theoretical usefulness ratings are each weighted at more than twice the weighting of the methodological adequacy category. Thus, a research study could have very poor methodology and still receive a high total score on the measure. This was in fact found when the instrument was used to evaluate nephrology nursing research (Molzahn, 1992, 1993), raising questions about validity of the tool. Other problems with the use of this instrument included low inter-rater reliability (K= -.01 for relevance, .07 for theoretical usefulness, and .05 for methodological adequacy), and low inter-item correlations.

Investigators in the area of meta-analysis have done significant work in the area of evaluation of quality of primary research. There have evolved two distinct approaches to this issue. Some authors have attempted to give a quality rating by the quantitative evaluation of threats to either internal validity, or both internal and external validity of a study (Brown, 1990; Devine & Cook, 1983, 1986). Others have developed or used existing lists of criterion indicators which evaluate critical aspects of research studies (Brown, 1988, 1990; Lynn, 1989; McCain & Lynn, 1990).

There is no agreement in the literature regarding the best approach to objectively evaluate quality of research. Brown (1991) reported that the correlation between scores on the "Research Appraisal Checklist" (Duffy, 1985, 1988) and total number of threats to validity was near zero. She suggested that each approach to measurement of research quality assessed a different construct. These results indicate a need for continued testing of the varied evaluation instruments. The question is raised as to whether "quality" has different meanings when used for meta-analysis or for critiquing research.

Research Appraisal Checklist.

Duffy (1985, 1988) reported the development of a 51 item "Research Appraisal Checklist" (RAC). The RAC is a criterion-referenced measure for application to research utilizing quantitative data collection and analysis methods. The 51 items are statement criteria regarded as important elements of a written research report. These items are arranged under 10 category headings relating to aspects of both the research process and presentation of the research study. Each item is rated on a scale ranging from 1 to 6 (not met to fully met), or N/A (not applicable). There is also an area for comments when an item is not scored as fully met. The scores are then summed to give a total score. Cut-scores are established to determine if the research article is below average, average, or superior in quality. Subcategory scores and comments can be used to help delineate strengths and limitations of research reports.

Duffy (1988) reported reliability and validity testing of the RAC. Inter-rater reliability for the total tool was 0.94. It is not stated if total numerical scores or classifications of quality were used in the calculation. This is important to know, as the intent of the measure is to classify research reports. Thus inter and intrarater reliabilities based on total scores may not be an accurate reflection of the actual reliabilities in relation to classification of level of quality of research. Internal consistency was calculated with alpha = .91 (N = 44) for the total test. The use of Cronbach's alpha as a measure of internal consistency using the total RAC score is of questionable value (Waltz, Strickland, & Lenz, 1991). As stated previously, the intent of this criterion-referenced tool is to classify research reports based on degree of quality.

In this context, one questions the meaningfulness of this measure of reliability. Test-retest and parallel forms' measures of reliability were not performed, nor was intrarater reliability. Thus, in terms of reliability of the RAC, the only real evidence is for interrater reliability.

Content validity was established by having the RAC items rated by 156 content experts, with subsequent calculation of inter-rater agreement and average congruency percentages. The items on the RAC were all classified as either greatly or extremely important criteria by the content experts. There was no statistical calculation of a level of interrater agreement, but it is obvious that there was 100% agreement that all items were important. In view of this, the need for calculating average congruency percentages is questioned, as it only indicated congruence between greatly or extremely important classifications, not congruence about classifications of important or not important items. Construct validity was assessed through the contrasted groups approach. The results showed a trend, but not a great deal of statistically significant evidence for construct validity. Decision validity was not addressed. Criterion-related validity testing was not appropriate as the purpose of the measure is not to make inferences of standing on other variables.

The RAC was used by Brown (1990) to assess research reports for use in meta-analysis. She reported interrater reliability as .89 (N = 10), and intrarater reliability as .94 (N = 5) after a period of 2 months. Cronbach's alpha was calculated at .89. Brown (1988) used the RAC in an earlier meta-analysis and obtained similar reliability results as those reported in 1990. The author does not state whether interrater and intrarater reliabilities were based on total scores, or on the classifications of quality. This information would be useful in interpreting the reliability values. Again, the question is raised regarding the appropriateness of using Cronbach's alpha as a measure of internal consistency for this instrument (Waltz et al., 1991).

Brown (1990, 1991) raised the issue of weighting of the items on the measure. She stated the concern that perhaps some items were more significant than others in the determination of quality of research. It was proposed that because all items were equally weighted, those of greater significance did not adequately contribute to the total score. Two other issues relating to use of the RAC were raised by Brown (1991). First, she stated that the results of the quality ratings did not agree with raters' subjective assessments of study quality. Subjective assessments were generally lower than RAC evaluations. Brown did not report any decision validity or item-analysis testing for the RAC. Second, the issue of whether the RAC measured the research quality or the quality of writing was discussed. It was suggested that journal editorial decisions and preferences may contribute to variance in RAC scores instead of deficiencies in the study itself.

The standards for the conduct and communication of research as defined by Duffy (1988) are grouped under 10 category headings. The blueprint for the RAC is presented in Table 2.1. The issue of weighting of items raised by Brown (1990) prompted an examination of this blueprint. Although it is true that each item contributes equally to the total score, a review of the blueprint indicated that a weighting process did in fact occur on two levels.

Table 2.1

Blueprint for Research Appraisal Checklist.

BLUEPRINT FOR RESEARCH APPRAISAL CHECKLIST	
Content	Number of Items
Title	3
Abstract	4
Form and Style	3
Problem	9
Review of Literature	6
Subjects	6
Instruments	5
Design	4
Data Analysis	4
Discussion	7
TOTAL	51

First was the relative weighting between measurement of the research process and measurement of communication of the research. The first three categories on the blueprint (Title, Abstract, Form and Style) referred to the presentation or communication of the research. These categories contained a total of 10 items, or 19.6 % of the total number of items on the measure. The remaining seven categories relating to the research process contained 41 items, or 80.4% of the total number of items. From this analysis it became apparent that measurement of quality of research was weighted such that the research process contributed to the total rating 4 times as much as the communication categories.

Second, when one looked at the relative weighting of items between categories, the number of items per category ranged from 3 (for each of Title, and Form and Style) to 9 (for Problem). It was at this level of weighting that potential disparities could be observed. It can be argued that the categories of Instrument (5 items), Design (4 items), and Data Analysis (4 items) should have equivalent numbers of items with the categories of Subjects (6 items) or Review of the Literature (6 items). All of these categories represented aspects of the research process that are integral to the overall quality of the study; perhaps they should receive equal weighting. Decision validity and item-analysis testing would help to determine if the existing RAC category weightings adversely affect the quality evaluations.

Analysis and Evaluation of Nephrology Nursing Research Literature

To date there has been one study which described and evaluated nephrology nursing research literature. Molzahn (1992,1993) studied research published between 1979 and 1989 using the following variables: research design, clinical area of nephrology nursing practice, content area of the research, dependent variables, and quality of research. There were several important findings in this study. First, the volume of published studies increased significantly, from 6 in 1979 to 41 in 1989. Second, approximately 70% of the research was related to dialysis treatments, while only 12.3% was related to transplantation. Third, 79% of the research was evaluated as being of high quality, despite significant numbers of problem areas identified within the items studied. Finally, 34.9% of the studies were descriptive, 45.4% were analytical observational, and only 14.1% were experimental.

Formulation of the Research Questions

The review of the literature indicated that the most appropriate method of describing the nephrology nursing research literature was the analysis of research. This method employed a research methodology, whereas an overview or survey would not. The analysis of research would provide the basis for an objective description of both the individual research studies and the body of published research. Meta-analysis was not appropriate for this project as the focus of combining research findings was not congruent with the purpose of this study.

In terms of the evaluation of quality of research, both for individual research studies and the entire sample, the research review and research critique formats were too subjective in the evaluation process. The desire was to bring as much objectivity as possible to this process. Thus, the evaluation of research using a set of standards was determined to be appropriate for this study. Of the methods for evaluating quality of research, the "Research Appraisal Checklist" was chosen because of the evidence for both content validity and rater reliability.

Finally, the review of previous research about nephrology nursing research assisted in the formulation of the research questions. There was a desire to maintain a degree of consistency of variables between Molzahn's (1992, 1993) study and this project. This consistency allowed for the comparison of findings. Thus the research questions for this project were:

1. What type of research design was employed in the research study?
2. Within the context of nephrology nursing, what was the clinical area of practice addressed by the research study?
3. What was the major topic area of the research?
4. What were the independent variables in the research?
5. What were the dependent variables in the research?
6. What was the quality of the published nephrology nursing research literature?
7. What were the most common problems in the methodology and presentation of the research?

Summary

Research about research, although not common, exists in a variety of forms. Overviews or surveys of research have minimal research methodology and the greatest degree of subjectivity of findings. Analysis of research literature is a mechanism of describing a body of published works. This method utilizes a research methodology with specified variables. The purpose of research analysis is to identify similarities, dissimilarities, or "problem area" within the group of research items. Meta-analysis is the integration of findings of multiple research studies, not a description of a body of research works.

Evaluation of research can refer to either research reviews, research critiques, or multiple other related terms. Evaluation of research is the use of standards to give a judgement of value to a research study. There are few methods or instruments for objectively quantifying quality of research. One instrument used in a limited number of research studies is the "Research Appraisal Checklist".

There is one study which has described and evaluated nephrology nursing research literature. Molzahn (1992,1993) studied this research literature published from 1979 through 1989. Individual research studies were described using research design, clinical area of practice, topic of research, and dependent variables as the descriptors. Items were also evaluated for quality of research. The body of research literature for the specified period was described in relation to the descriptor variables.

III. METHODS

The purpose of this chapter is to describe the research design, and methodology used in this study. The sample will be described, including a description of how sample items were selected and a discussion regarding difficulties with the sample selection process. The instruments used for data collection will be discussed in relation to reliability and validity testing, training, and administration. The methods used for data collection and analysis are outlined, including mechanisms used for ensuring reliability of coding and data entry. This chapter concludes with a description of ethical issues relating to this research project.

Research Design

An exploratory-descriptive design was used in this study. This approach was appropriate as all of the research questions focused on the identification of variables which served to describe particular aspects of published research reports. There were no predicted relationships among the variables. As it was descriptive in nature, and did not involve human subjects, issues relating to control of extraneous variables, Hawthorne effect, and time, maturation, and development were not relevant. Issues of external validity were of concern in this study, as the generalizability of the findings of this study were limited by uncertainty as to the representativeness of the sample. The results were discussed only in relation to the body of items studied. Experimenter bias was a potential threat to the internal validity of this study. The knowledge and skills of the raters in relation to administering the measurement instruments may have changed over the course of the research project, resulting in an items score being influenced by its position in the scoring order. The rater reliabilities calculated in this project did not provide strong evidence for this concern. Additional experimenter characteristics that may have affected internal validity were levels of fatigue, boredom, anxiety (situational characteristics) that varied with time. These characteristics will have decreased the internal validity by increasing random error in the data. Rating consistency was monitored and optimized where possible. Thus the intrarater and interrater reliability calculations were important in this study.

Sample

Description of the Population

The defined population of nephrology nursing research literature was similar to that used by Molzahn(1992,1993). For this research project the study population consisted of books, monographs, dissertations, or articles contained in a major journal; written in English; authored or co-authored by a nurse; used human subjects; and pertained to the care of individuals with acute or chronic renal disease. Patient care was defined as including activities that involved assessment, intervention or interaction with a patient with the **objective of resolving or alleviating an actual or potential health problem** (Molzahn, 1992,1993). Master's theses were included if they were available. For this study, publication of research occurred from 1990 through 1992.

The questions: "What is nursing?" and "What is nursing research?" were considered when determining the population definition for this study. There appears to be a general lack of consensus within the nursing "community" about what nursing and nursing research actually are. To avoid this debate in relation to this study the term patient care was used, although using this term has some limitations. Patient care is provided by professions other than nursing, thus some literature included in the sample was not directly related to nursing practice. For example, some studies coauthored by a nurse were related to medical care instead of nursing care. Research by nurses that did not use human subjects was excluded from the population. Examples of this type of exclusion are research in the areas of renal physiology or dialysis/dialyzer specifications or nursing management, all of which would have an indirect impact on patient care.

The population of nephrology nursing research literature used in this project addresses the care of patients with either renal failure, or chronic disease leading to renal failure. It must be noted that this population does not represent the entire range of disease conditions within the medical specialty of nephrology (i.e.. treatment of renal calculi, and treatment of renal diseases not associated with chronic or acute renal failure). The intent of this study is to include research reports which are representative of nephrology nurses research interests. Thus, the population definition is specific for research pertaining to the care of patients with renal failure.

Despite these limitations, the population definition does provide a good definition for a body of nursing research related to patient care. The inclusion of what may be defined as "medical research" can be argued that on the basis of providing patient care the results of this research are relevant for nurses. The fact that nurses are involved in this type of research is in itself indicative of the interest of nephrology nurses in obtaining this type of knowledge.

For this project, maximum latitude was given when using the population definition to develop selection criteria, especially in relation to the assessment of the research objective. Thus, a study looking at aminoglycoside pharmacokinetics with the objective of developing dosing guidelines to reduce auditory complications in patients was considered to be patient care research; whereas a study looking at antibiotic pharmacokinetics with a goal of describing the nature of the drug was not patient care research. A study looking at mortality and morbidity in a population with the goal of identifying risk factors for patients was included; and a study looking at mortality and morbidity in relation to health care costs was excluded.

Sampling Methods

Inclusion criteria for determining appropriate research publications was derived from the population definition. See Table 3.1 for a list of inclusion criteria. Research reports were reviewed on two separate occasions to determine suitability for inclusion; at the time of retrieval of the item, and at the time of data collection. An inclusion criteria checklist (ICC) was developed to assist in the reviewing process (see Appendix A). Research reports that met the inclusion criteria at the retrieval stage were given identification numbers and targeted for data collection.

Table 3.1

Inclusion Criteria for the Study Sample.

Inclusion Criteria
1 - Item was published in 1990, 1991, or 1992.
2 - Item was either a book, monograph, dissertation, journal article or master's thesis.
3 - Item was written in English.
4 - Item was authored or co-authored by a nurse.
5 - Item used human subjects.
6 - Item pertained to patient care of individuals with acute or chronic renal disease.
7 - The objective of the study was to resolve or alleviate an actual or potential health problem.
8 - The item was a research report.

The sample for this project ideally consisted of the total population of research literature meeting the inclusion criteria. In reality, there were items not included in this study. Difficulties were encountered in two distinct areas relating to the sampling process. First, the identification of appropriate research articles was problematic, primarily in relation to determining if a nurse was an author or coauthor. Secondly, there were difficulties in retrieving sample items. The result of these difficulties was that the size of the study population remained unknown due to incomplete identification of nurse authors. Thus, the proportion of the total population included in the sample could not be calculated. These unknown factors place limits on levels of confidence about the sample's representative of the population, thereby limiting the generalizability of the findings of this study.

Sample Item Identification

Published research items were identified in three ways. Initial computer searches of the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline databases were conducted using nephrology terms both with and without a nursing subset. The results of these searches yielded minimal results, as they did not capture publications coauthored by a nurse unless it was specifically coded as "nursing research" within the database. Additionally, CINAHL did not allow for the appropriate differentiation between research reports and nonresearch articles. The items identified through this initial search were retrieved and reviewed, and items which met the inclusion criteria were selected.

Major nursing and nephrology journals were then reviewed to identify items suitable for this study. See Table 3.2 for a list of the journals reviewed. This process resulted in a substantial number of research reports not identified in the original computer search. These items were primarily coauthored by nurses and published in nephrology journals. This search strategy presented problems in that the majority of nephrology journals published the academic credentials for either none of the authors, or the primary author only. Thus, identification of nurses as coauthors was impossible for many of the journals. Potential items were occasionally identified by author institution affiliations that listed a school of nursing or department of nursing.

All articles retrieved to this point were then reviewed and a list was compiled of authors identified as nurses. Additional sources of names of nephrology nurses such as the American Nephrology Nurses' Association (ANNA) and Canadian Association of Nephrology Nurses and Technicians (CANNT) journal authors, boards of directors, committee members etc. were reviewed. This strategy resulted in a list of 225 names. From this "master list", computer searches of CINAHL and Medline were done using author as the search term. This search strategy yielded more sample items, primarily research articles published in journals not identifying author affiliations, or articles published in journals that do not normally address nephrology issues.

The difficulties encountered in identifying research articles authored or coauthored by nurses created a potential reduction in the generalizability of findings of this project to the body of nephrology nursing research published in 1990 through 1992. It was impossible to know if the items identified comprised the total population. Thus,

Table 3.2

Journals examined for research article identification.

Name of Journal
1 - ANNA Journal
2 - CANNT Journal
3 - Nursing Research
4 - Image
5 - American Journal of Kidney Diseases
6 - Peritoneal Dialysis International
7 - Advances in Peritoneal Dialysis
8 - American Society for Artificial Internal Organs Journal
9 - Transplantation
10 - Dialysis and Transplantation
11 - Contemporary Dialysis & Nephrology
12 - American Journal of Nephrology
13 - Pediatric Nephrology
14 - Clinical Nephrology
15 - Artificial Kidney and Dialysis
16 - Contributions to Nephrology
17 - Transplantation Proceedings
18 - Kidney International
19 - International Journal of Artificial Organs
20 - Nephron

the degree of limitation to generalizability is unknown.

Research Article Retrieval

Published articles in journals available at the John Scott Library were easily obtained. There were several journals not available at this library, therefore two strategies were employed to locate and retrieve items. First, the private libraries of several nephrologists were surveyed to locate needed journals. Second, the interlibrary loan system was utilized to request all items not available locally. After a three month time period, 27 of 60 loan requests were not filled. All identified doctoral dissertations were unavailable through the loan system. Sample items were photocopied for use in data collection.

The number of potential sample items that were not available in the retrieval stage of this project potentially limited the degree to which this study sample was representative of the total population of nephrology nursing research published in 1990 through 1992. As the unretrieved items were "potential" items only, the degree of limitation to finding generalizability is unknown. In view of the combination of possible limits to generalizability, from both the item identification and item selections processes, the findings of this study were presented in relation to the sample only, and no inferences were made about the population.

Description of the Study Sample

Prior to data collection, research items in the sample were reviewed for a second time to ensure that they met all of the inclusion criteria. There were 207 items initially retrieved for the sample. After the second inclusion review, this number dropped to 194. Thus, the sample for analysis by the descriptive variables was 194 research items. Two items were Masters' theses, the remaining 192 items were journal articles. The final sample contained items from 44 different medical and nursing journals. There were no books nor monographs identified for inclusion. Appendix B lists the journals containing the sample items, and the number of items retrieved from each publication.

Instruments

This study involved the administration of two instruments. The "Research Classification Instrument" (RCI) (Appendix C), measured the descriptive variables in identified in the research questions. The "Research Appraisal Checklist" (RAC) (Appendix D), measured the quality of research. The instruments were administered to each item in the sample by two raters. Rater #1 was the investigator. Rater #2 was a nurse with graduate education in research methodology and medical-surgical nursing experience.

Analysis of Nephrology Nursing Research

Each item in the sample was coded using the RCI. This instrument was developed by the investigator based on the research questions. The RCI contained both criterion-referenced items with descriptive domains, and content analysis items. The variables measured by this instrument were: research design (criterion-referenced), clinical area of practice (criterion-referenced), major topic of research (content analysis), independent variables (content analysis), and dependent variables (content analysis).

Content Validity

Five items on the RCI were tested for content validity by two nurse experts. Each of the nurse experts had graduate education in research design and greater than 10 years of nephrology nursing experience. See Appendix E for the RCI Content Validation Worksheet. The experts were asked to rate the items pertaining to clinical area of practice, research design, major topic of research, independent variable, and dependent variable. Ratings were given which represented the degree of congruency with item objectives (criterion-referenced items) or degree of congruency with the item definitions (content-analysis items). The average congruency percentage (mean of the proportion of items rated congruent by each expert) was calculated. In this case the average congruency percentage was 90%. This indicated an acceptable level of content validity (Waltz, Strickland & Lenz, 1991).

Reliability Testing

Stability of the instrument. Test-retest agreement, or stability of the measure over time, was calculated for the RCI. The test-retest procedure was done in the following manner. Each rater administered the RCI to 20 research items randomly selected from the study sample. After a period of at least one month, the same rater scored the same group of reports. The number of items for the test-retest calculations was $n = 40$.

The results for each of the criterion-referenced items were plotted on test results matrices. Calculations were performed for P_o, K, K_{max}, and K/K_{max} ratio (Waltz, Strickland & Lenz, 1991). See Appendix D for a sample test result matrix and formulas for the statistical calculations. A K/K_{max} ratio of 0.85 or greater was considered an indicator of high levels of stability of the measure . Content analysis items were compared for proportion of agreement of specified content (P_o) from administration 1 to administration 2. A proportion of agreement greater than .80 was considered to be indicative of high levels of stability. Table 3.3 contains the results of the reliability statistics for the RCI.

The k/k_{max} ratio for the two criterion-related items (research design and area of nursing practice) were greater than 0.85, thus providing evidence that these items on the instrument were stable over administrations of the instrument. The three content analysis items (topic of research, independent variable, and dependent variable) did not achieve high degrees of stability. The item measuring topic area of research was almost at the 0.85 level, indicating a moderate degree of stability. The items measuring

Table 3.3

Stability calculations for the "Research Classification Instrument".

	RELIABILITY STATISTIC			
INSTRUMENT ITEM	P_O	k	k_{max}	k/k_{max}
1. Research design	0.63	0.52	0.59	0.88
2. Area of nursing practice	0.93	0.90	0.90	1.00
3. Topic area of research	0.83			
4. Independent variables	0.63			
5. Dependent variables	0.45			

P_O = the proportion of observed agreements.

k = the proportion of non-chance agreements.

k_{max} = the maximum possible value of k for this specific situation.

k/k_{max} = a standardized value for consistency of classification. The closer the value is to 1.0, the higher the degree of consistency.

the independent and dependent variables were significantly lower than required to indicate acceptable stability.

There are two potential reasons for the lack of stability of the two content analysis items. First, the items reflect the results of analysis of the content of a research report. The clarity of variable identification in individual research reports may impact the accuracy of analysis by the rater. For example, a research study may correlate multiple dependent variables in a search for risk factors for a particular condition and then present significant correlations as causative factors instead of relationships. This lack of clarity within a research item could impact the accuracy of content analysis for research variables, and thus lower the results of the stability testing.

Second, the definitions of independent and dependent variables used for the content analysis may not have been sufficiently clear despite the content validity experts ratings of congruency between item and definition. This would allow for variations in interpretation by the raters, and subsequently lower the stability calculations. For example, the definition of the independent variable states that it is the manipulated or causative variable in a research study. The terms manipulated and causative may not be specific enough in defining the term.

In summary, the stability testing for the RCI showed evidence for stability for three of the five items tested. The two items which lacked stability related to content analysis of research reports to identify independent and dependent variables. Measures taken to counteract this lack of stability are described in the data collection section of this chapter.

Rater reliabilities. Interrater reliability, or the consistency of classification between the raters, was determined by having both raters administer the RCI to an identical random sample of 20 research reports. Intrarater reliability, or the consistency of classification for a single rater was assessed by having each rater administer the RCI to score 20 research reports at an interval of at least one month. Thus there were three sets of rater reliability calculations. Criterion -referenced classifications were plotted on a test results matrix. Content analysis items were assessed for proportion of agreement of specified content. Calculations for P_o and k (where applicable) were made for the three rater reliability tests. High levels of reliability for both interrater and intrarater reliabilities were considered to be P_o and k values greater than .90. Results of the statistical calculations for rater reliabilities are found in Tables 3.4 and 3.5.

Interrater reliability was found to be high for the item relating to area of nursing practice. Reliability for identifying topic of research was $P_o = 0.75$; lower than desired but still indicating a moderate degree of consistency. The consistency between raters for classification of research design was $k = 0.23$, indicating almost no consistency. The reasons for this are unclear. The interpretation of the research design classifications by each rater may have been a factor, although the content validity experts rated the item as congruent with the item objective and definitions. The items used for the identification of independent and dependent variables had low levels of interrater reliability. The reasons for this may include clarity of identification of these variables within research items, and interpretation by

Table 3.4

Interrater reliability calculations for the "Research Classification Instrument".

	RELIABILITY STATISTIC	
INSTRUMENT ITEM	P_o	k
1. Research design	0.30	0.23
2. Area of nursing practice	0.95	0.93
3. Topic area of research	0.75	
4. Independent variables	0.50	
5. Dependent variables	0.40	

P_O = the proportion of observed agreements.

k = the proportion of non-chance agreements.

Table 3.5

Intrarater reliability calculations for the "Research Classification Instrument".

	RELIABILITY STATISTIC			
	RATER #1		RATER #2	
INSTRUMENT ITEM	P_o	k	P_o	k
1. Research design	0.95	0.93	0.30	0.07
2. Area of nursing practice	0.90	0.87	0.95	0.93
3. Topic area of research	0.90		0.75	
4. Independent variables	0.85		0.40	
5. Dependent variables	0.80		0.10	

P_O = the proportion of observed agreements.

k = the proportion of non-chance agreements.

raters of the definitions for the instrument items.

Intrarater reliabilities for Rater #1 were high for all instrument items except classification of area of nursing practice ($k = 0.87$) and identification of independent and dependent variables (P_o of 0.85 and 0.80 respectively). The consistency for classification of area of nursing practice was close to the desired level, thus indicating a moderate to high degree of reliability. The reliabilities for identification of the two content analysis items are also at moderate levels. A possible reason for the lower consistency of scoring of the two content-analysis items may be the clarity of variable description within research reports.

Consistency of scoring for Rater #2 was high only for the item relating to classification of area of nursing practice. Consistency for identifying the topic area of the research was moderate at $P_o = 0.75$. The consistency calculations for classification of research design ($k = 0.07$), and identification of independent variables ($P_o = 0.5$) and dependent variables ($P_o = .04$) were very low. These low scores indicate unacceptable consistency in item scoring.

Reasons for the inconsistency in classification of research design are unclear. Reliability for this test item was acceptable for Rater #1, thus it is unlikely that item definitions or clarity were major factors. As previously described, low consistency for the variable items may relate to the nature of the items (content-analysis) and clarity within the individual research items.

In summary, stability of the RCI was moderate to high for all test items except those addressing the classification of research design and identification of independent and dependent variables. Consistency of scoring by Rater #1 was moderate to high for all items on the measure. Consistency of scoring by Rater #2 was moderate to high for items relating to the classification of area of nursing practice, and the identification of topic area of the research. Consistency was unacceptable for classification of research design, and identification of independent and dependent variables. Measures taken in regards to the low consistency ratings are described in the data collection section of this chapter.

Evaluation of Nephrology Nursing Research

Each item in the sample that used quantitative data collection and analysis methods was evaluated for quality of research. Of the total study sample n=194, there were 9 items with qualitative data collection methods. Thus, the sample of research items evaluated for quality of research was n= 185.

Quality of research was defined as the assessment of the credibility of both the research process and the clarity of communication of the research process. The instrument "Research Appraisal Checklist" (RAC), developed by Duffy (1985, 1988) was used to evaluate quality of research. The RAC is a 51 item criterion-referenced measure for application to research utilizing quantitative data collection and analysis methods. Permission to use the RAC in this project was obtained from M.Duffy. Validity and reliability determinations were made for the RAC as part of this research project.

Construct Validity

Construct validity of the RAC was evaluated through the determination of decision validity using a criterion groups approach. Decision validity testing was accomplished in the following manner. A set of 20 research items from the study sample were selected. Items were selected to include a range of total RAC scores (from low to high), as well as a range of quality ratings (below average to superior). The quality ratings of this set of items was compared to quality ratings (below average to superior) given to the items by members of an expert panel. Members of the expert panel were nurses with graduate education in research methods and design.

Due to the subjective nature of "traditional" research evaluation, and the variability of criteria used in these types of quality of evaluations, measures were taken to ensure that the quality ratings of the experts were valid. Each of the 20 study items was evaluated by three panel members and classified as superior, average, or below average quality. Only those research reports whose quality classification was rated similarly by at least two raters was used for the decision validity procedure.

A total of 60 research items (20 x 3 ratings each) were sent among members of the expert panel (n = 11). Eight of the eleven experts returned the research quality ratings, for a response rate of 73%. Within the group of expert evaluations, there was consensus of quality classification for 13 research items. The RAC classifications and the experts' classifications for these 13 items were placed on a matrix (Table 3.6), and P_o and k calculated for agreement of classification. For the group of 13 items $P_o = 0.46$, and k = .14.

Table 3.6.

Test result matrix - decision validity for the "Research Appraisal Checklist".

		RAC CLASSIFICATION		
		Below Ave.	Average	Superior
EXPERT PANEL	Below Ave.	1.00	3.00	
	Average		5.00	
	Superior		4.00	

The higher the congruence of classification, the greater the evidence for decision validity (Waltz, Strickland, & Lenz, 1991). In this case, a P_o or k value of 0.75 or greater was regarded as evidence for a high level of decision validity. Neither the obtained P_o or k values met this standard. These calculations indicated that the agreements between RAC and the expert panel were nonchance only 14 % of the time. Thus, a poor degree of decision validity was demonstrated.

The decision validity procedure can be influenced by the quality of the measure, the appropriateness of the criterion groups, the characteristics of the subjects, and the cut scores used in defining classifications (Waltz, Strickland, & Lenz, 1991). In this case, evidence for content validity of the RAC items was determined by Duffy (1988). Appropriateness of the criterion group was promoted through obtaining consensus in quality ratings by the experts. However, characteristics of the 13 research reports used in the decision validity testing may have negatively influenced the decision validity results. The research reports used in this validity test were not randomly selected, therefore there is the potential for bias in the testing.

There was a high degree of homogeneity in RAC ratings despite a relatively wide range of total scores. This homogeneity in classifications is seen in Table 3.6, where RAC classifications were "Average" for 12 of 13 items, in contrast to the expert panel classifications of below average (4), average (5), and superior (4). The consistency of average quality ratings with the RAC resulted in lowered decision validity. This homogeneity of RAC ratings indicated that there may be a problem with the cut-scores used to define quality of research.

The subjective nature of research evaluation is an issue with the administration of the RAC, and associated decision validity. The cut scores for classification of research quality were defined with the development of the measure (Duffy, 1988). There remains a large subjective component in the administration of the RAC, as the items are scored from 1 to 6. This method of scoring allows for subjective assessments of the degree to which the items are met. This subjectivity influences the total score for the measure, thus affecting the relationship of the total score to the defined cut scores. Appropriate cut scores to accurately classify quality of research may vary between users of the instrument.

There are two potential solutions to this problem of inappropriate cut scores. The first solution is to increase the consistency of item scoring. This could be achieved by developing objective criteria to define the degree that a test item is to be met for each numerical score. With increased objectivity in scoring RAC items, the existing cut scores could remain static. The second option is to develop a method to vary the cut scores for each user of the instrument to ensure that appropriate quality ratings are achieved.

In summary, decision validity of the RAC was not strongly supported in this study ($n = 13$, $P_o = 0.46$). Of the factors affecting decision validity, the non-random selection of items in the procedure, the low sample number, and homogeneity of classification agreements all had probable negative effects on the calculation of decision validity in this study. The possibility of inappropriate cut-scores was likely to have had a significant effect on the actual decision validity of the measure.

Reliability Testing

Test-retest procedures, and interrater and intrarater agreements were calculated using agreements of RAC quality ratings. The methods regarding item testing and analysis for both stability of the measure and rater consistency were identical to those described for the RCI. Results for the reliability tests are presented in Table 3.7. Stability of the RAC was considered high, with a k/k_{max} ratio = 1.0 and proportion of agreements in quality classifications of 0.98. This calculation was influenced by the distribution of the agreements on the test results matrix. (Waltz, Strickland, & Lenz, 1991). With almost 100% agreement in classification ratings the level of homogeneity of agreements was high. This lack of variability of agreements in classifications resulted in identical calculated values for k and k_{max} . Thus the k/k_{max} ratio was automatically 1.0. This k/k_{max} ratio is an overestimation of the stability of the instrument. However, with a P_o of 0.98, there can be confidence that the level of stability is high.

Consistency of classification for interrater and both intrarater test procedures was high, with P_o values ranging from 0.9 to 1.0. The low k values of 0.62 and 0.64 were the result of negative influences caused by the shape of the distributions of agreements on the test result matrices. The small number of disagreements in classification had a larger effect on k, because of the homogeneity in classification of the items (16/20 and 18/20 items classified as average). The k = 1.0 for Rater #2 was an overestimate of consistency due to homogeneity of classifications (100% agreement in classifications where 80% of the classifications were average).

Table 3.7

Results of rater reliability testing for the "Research Appraisal Checklist".

	Type of Statistical Calculation				
		P_o	k	k_{max}	k/k_{max}
Type of Rater Reliability	test-retest	0.98	0.66	0.66	1.00
	interrater	0.90	0.62		
	intrarater				
	Rater #1	0.95	0.64		
	Rater #2	1.00	1.00		

P_O = the proportion of observed agreements.

k = the proportion of non-chance agreements.

k_{max} = the maximum possible value of k for this specific situation.

k/k_{max} = a standardized value for consistency of classification. The closer the value is to 1.0, the higher the degree of consistency.

In summary, there was evidence for high levels of reliability of classification of research quality for both the RAC and the individual raters. The k values, or proportion of non-chance agreements were affected by the homogeneous distribution of classification agreements within all of the groups of items scored.

Training

Training in the use of both the RCI and RAC were done using nephrology nursing research published in 1993 or 1994. The training consisted of administering the instruments on samples of three research articles and then reviewing disparate codings to achieve agreement. This process was repeated four times due to two types of scoring problems. First, there was disparity in scoring of the research design item on the RCI. This was primarily due to Rater #2 being unfamiliar with the research design classifications and definitions. Secondly, there was difficulty in achieving agreement on items on the RAC. The difficulty was in differentiating the degree to which the criteria were met. For example, when scoring the instrument item "Studies are critically examined", what defined "fully met" (score of 6) versus "partially met" versus "not met" (score of 1)? When greater than 90% agreement for scoring both instruments on a sample of three items was achieved, training was considered complete.

Data Collection

Data collection was the responsibility of the investigator (Rater #1) and one research assistant (Rater #2). The research assistant was a nurse with medical-surgical experience and graduate education in research methodology. Data collection took place during a four month period, from November 1994 to February 1995. Of the 194 items rated, 100 were scored by Rater #1 and 94 were scored by Rater #2.

The 94 items scored by Rater #2 were subsequently reviewed by Rater #1 in order to re-administer the RCI items pertaining to research design, independent variables, and dependent variables. This review was necessitated by the low interrater reliability scores and Rater #2's low intrarater reliability scores for these items. The intrarater reliabilities for the three variables were moderate to high for Rater #1. Thus all sample items (n = 194) were scored for research design, independent, and dependent variables by Rater #1. The scoring of these items by one rater increases confidence that there was consistency in scoring within the items.

Data Analysis

Data analysis consisted of descriptive statistical techniques. Data collected with the RCI were reported as frequencies and percentages of the total sample. RAC scores and classifications were analyzed using frequencies of the ratings and the distribution of the total score values. All descriptive variables, quality of research classifications, and identification of problems in the research were presented both for the individual research items, and for the body of research items in the study.

To determine common problems with the methodology and presentation of the research studies, the RAC category scores were analyzed for each of the 10 categories. A score of 1 or 2 on a RAC item was considered a poor score, a value of 3 or 4 was average, and a value of 5 or 6 was considered superior. Score ranges for each classification (below average to superior) of the RAC categories was calculated by multiplying the upper and lower scores for the classification by the number of questions in the category. Frequencies for the score ranges were calculated. The frequencies were compared with the frequencies of classification for the total RAC instrument. Disproportionate frequencies of poor classifications would indicated that for the body of research literature there were problems common to a particular research category.

Data analysis was facilitated by entry of all data into a computer file (LOTUS 123 release-4) by the investigator. Statistical calculations were done using the statistical package accompanying the LOTUS 123 package. Accuracy of data entry was assessed in two ways. Twenty sample items were randomly selected, and data entry for the RCI was checked. There was 100% accuracy of data entry for the selected items. Computer program @SUM functions were used to add both the sub-category and test item scores for the RAC for all 194 study items. These totals were compared to the entered total score. Discrepancies between the three scores indicated that there was either a data entry error or an addition error in the scoring process. Discrepancies were found in approximately 35% of the compared scores and were found to be due primarily to addition errors. All cases of error were corrected, thus ensuring that the data entry for the RAC was accurate.

Ethical Considerations

Ethical issues relating to university ethics approval processes were not a factor in this study as the subjects were research articles, not people. One needs to remain aware that this study is examining the work of other people; and attempts were made to demonstrate that consistent and valid data collection instruments and methods were used. It would not be acceptable to have given a research study a poor evaluation when in fact that was not the case.

Summary

In this chapter an exploratory-descriptive research study designed to analyze and evaluate nephrology nursing research literature was described. The study population consisted of research articles written in English, authored or co-authored by a nurse, used human subjects, and pertained to the care of individuals with acute or chronic renal disease. The "ideal" study sample was all items in the population. This goal was not attained due to difficulties both identifying and retrieving research articles. The study sample consisted of 194 research reports. Two of the reports were unpublished Masters' theses, the remaining 192 items were journal articles.

Two instruments were administered for each research report. The "Research Classification Instrument" consisted of both criterion-referenced and content analysis items designed to measure research design, clinical area of practice, major topic of research, independent variables, and dependent variables. Content validity of the RCI was assessed by two nephrology nurse experts. The average congruency percentage was 90%, indicating an acceptable level of content validity. Stability of the measure was acceptable for three of the five items on the measure. The two items which lacked stability related to content analysis of research reports to identify independent and dependent variables. Consistency of scoring was moderate to high for Rater #1; Rater #2 achieved low levels of consistency on three of the items. These items were rescored by Rater #1 to increase the reliability of the scoring.

The "Research Appraisal Checklist" was used to evaluate quality of research for each of the research reports utilizing quantitative data collection techniques (n=185). Decision validity testing indicated that correct nonchance classifications for research quality occurred only 14% of the time; thus there were low levels of decision validity. The major factor in this low validity appears to be inappropriate cut-scores for the instrument. There were high levels of rater consistency for this instrument.

Data collection occurred over a four month period of time. Data analysis consisted of descriptive statistics, primarily frequencies and proportions. Data were presented for both individual research items, and the whole of the study sample.

IV. RESULTS

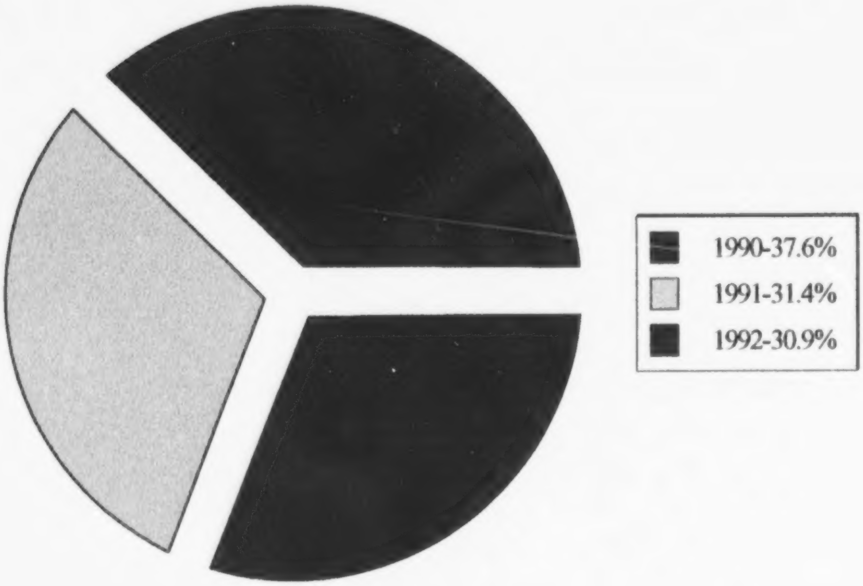
The purpose of this chapter is to describe the body of nephrology nursing research literature in relation to the study questions. A listing of references for each sample item is presented in Appendix G. Descriptive results for each item are summarized in table form in Appendix H. Results for the total study sample, research design, clinical area of practice, and quality of research are described for both total period of publication (1990 - 1992), and for each of the years.

Description of the Total Sample

The total sample contained 194 items. Publications by year were: 1990, 73 items (37.6%); 1991, 61 items (31.4%), and 1992, 60 items (30.9%). See Figure 4.1. For the variables relating to research design, clinical area of nursing practice, topic area of research, and identification of independent and dependent variables, n=194. Nine items (4.6%) utilized qualitative data collection methods and were excluded from the evaluation of quality of research. Thus n=185 for all analyses relating to quality of research.

Of the total number of items, 192 were published in a total of 44 journals. There were 2 unpublished Masters' theses in the sample. Of the total (n=192) of published articles, (24%) were published in the American Journal of Kidney Diseases, followed by American Nephrology Nurses' Association Journal (13%), Advances in

Figure 4.1. The percentage of nephrology nursing research literature (n=194) published in each of the years 1990, 1991, and 1992.



Peritoneal Dialysis (8%), and Peritoneal Dialysis International (8%). The remaining research studies (49%) were published in a total of 40 journals.

Research Design

In relation to classification of research design, evaluative designs were used in 89 (46%) of the total number of items. This was followed by epidemiological designs in 43 items (22%), survey designs in 38 items (20%), exploratory-descriptive designs in 21 items (11%), methodological designs in 2 items (1%), and experimental designs in 1 study (0.5%). There were no items utilizing historical research designs. See Figure 4.2.

Analysis of research design by year showed a reduction in the proportions of research with survey and exploratory-descriptive designs for the year 1991 with a subsequent increase in 1992. Research studies with epidemiological designs increased in proportion for 1991 and then markedly dropped in 1992. Research utilizing evaluative designs steadily increased through the years, from 39.7% for 1990 to 53.3% in 1992. See Figure 4.3.

Clinical Area of Practice

The largest proportion of research items (42.3%) pertained to nephrology nursing research in the area of peritoneal dialysis (PD). This was followed by hemodialysis (HD) (29.4%), renal transplantation (TX) (18.0), end-stage renal disease

Figure 4.2. The percentage of research items (n=194) classified for each research design category.

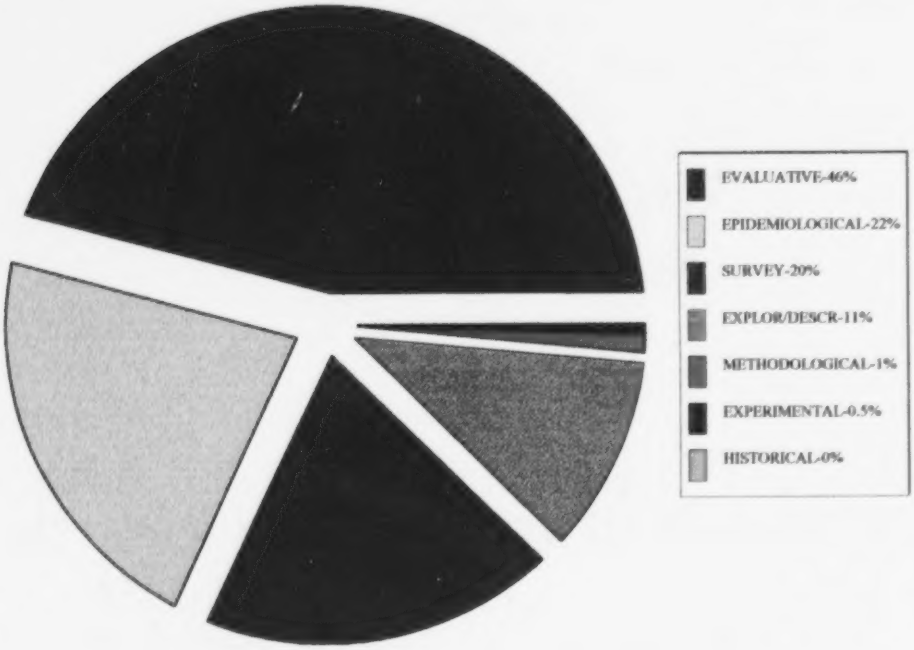
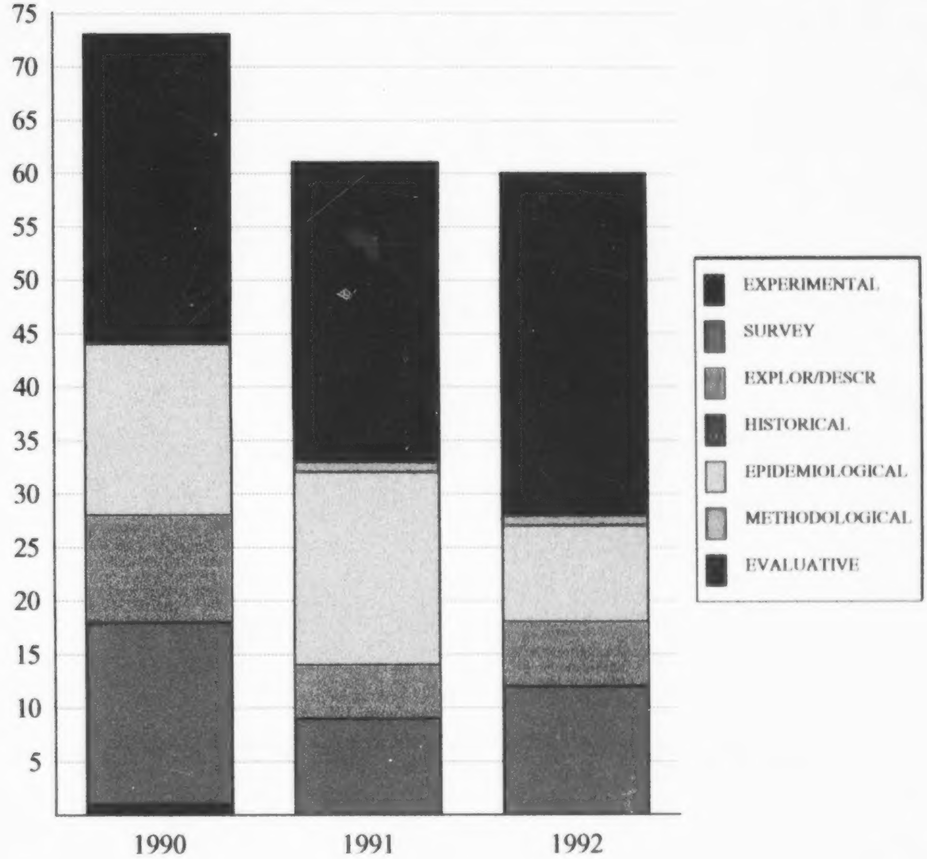


Figure 4.3. The frequencies of classification of research items for the variable "research design" for each of the years 1990, 1991, and 1992.



in general (ESRD) (7.2%), and acute renal failure in general (ARF) (3.1%). Analysis of the distribution of clinical areas for each of the three years included in the study shows increasing numbers of publications for the areas of renal transplantation and end-stage renal disease in general. Decreasing numbers of research items were noted for the clinical areas of hemodialysis, peritoneal dialysis, and acute renal failure. These results are displayed in Figures 4.4 and 4.5.

Major Topic of Research

Content analysis of the research studies identified 62 descriptive categories for research topics. The nature of the topics varied widely. See Table 4.1 for a listing of the categories and proportions of frequencies of the classified items. A number of research items had more than one topic identified. Thus, a total of 248 areas of study were identified in the group of 194 items. The most common areas of study were: pediatrics (n=19), erythropoietin (n=17), mortality/morbidity (n=15), PD complications (n=13), peritonitis (n=12), quality of life (n=10), immunosuppression (n=9), and dialysis system/modality (n=9). Only one item was assigned for each of 18 topic categories. These categories included: mood state, recreation, helplessness, coping, cognitive function, organ donation, sleep disorders, central lines, and blood sampling. Appendix H details the topic classification for each study.

Figure 4.4. The percentage of research items (n=194) classified for each category of clinical area of nephrology nursing practice.

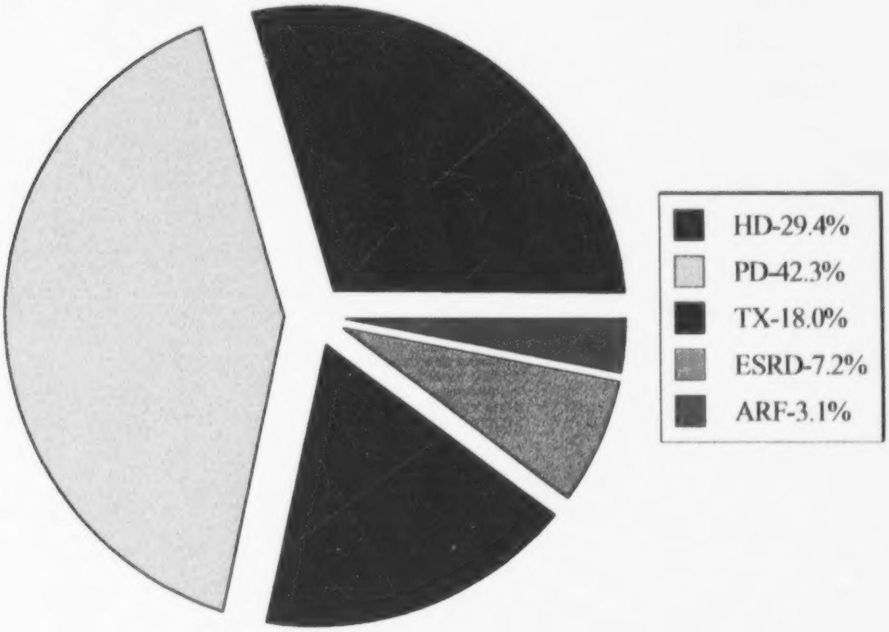
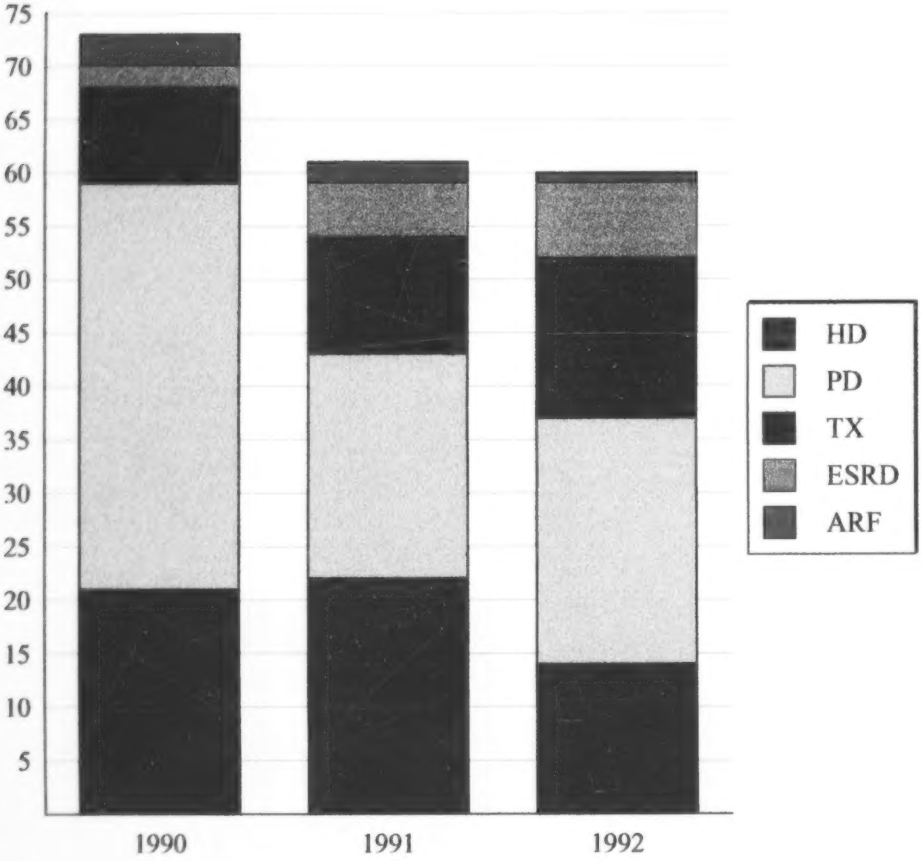


Figure 4.5. The frequencies of classification of research items for the variable "clinical area of practice" for each of the years 1990, 1991, and 1992.



Independent Variable

Of the 194 research items, 101 had one or more independent variables. Of these, 4 studies had 2 independent variables, and 2 studies had 3 independent variables. There were a total of 109 independent variables identified and analyzed to produce a total of 31 descriptor categories. The categories with the highest frequencies of classification were: medication administration (n=17), dialysis system/modality (n=16), and erythropoietin (n=12). There were 18 descriptors assigned one research item each. These variables included: behavior modification, anticoagulation, cognitive function, mood state, viral infections, and growth hormone. Table 4.2 gives the proportions for each independent variable descriptor. Appendix H details the independent variable classification for each research item in the study.

Dependent Variable

Dependent variables were identified for all of the research items (n=194). There were 54 items with 2 dependent variables, 38 items with 3 dependent variables, 14 items with 4 dependent variables, 7 items with 5 dependent variables, and 4 items with greater than 5 dependent variables. There were a total of 428 dependent variables identified. Content analysis of these variables resulted in 74 descriptor categories. The descriptors with the highest frequencies of classification for dependent variable were: biochemical parameters (n=43), mortality/morbidity (n=28), hematological parameters (n=26), physical/physiological parameters (n=20), peritonitis (n=19), peritoneal dialysis (PD) complications (n=19), and comorbid diseases/conditions (n=16). There were 21 descriptor categories with a frequency of one item. Examples of these categories are: sleep disorders, depression, rehabilitation, helplessness, uncertainty, expectations, self-esteem, healthcare practices, cost of treatment, and organ donation. See Table 4.3 for the proportions for each descriptor category. Appendix H contains details of the dependent variable categorizations for each study item.

Table 4.1. Descriptor categories for the variable "topic area of research", and the frequency and percentage of research items classified for each category.

Descriptor Category	n	%
Pediatrics	19.0	7.7
Erythropoietin	17.0	6.9
Mortality/Morbidity	15.0	6.0
PD complications	13.0	5.2
Peritonitis	12.0	4.8
Quality of life	10.0	4.0
Immunosuppression	9.0	3.6
Dialysis system/modality	9.0	3.6
Hemodialysis access	7.0	2.8
Adequacy of dialysis	7.0	2.8
Infection/sepsis	7.0	2.8
Geriatrics	5.0	2.0
Risk factors	5.0	2.0
Exit-site infections	5.0	2.0
PD catheters	5.0	2.0
Antibiotics	5.0	2.0
Anemia	5.0	2.0
Compliance	5.0	2.0
CAVH(D)	4.0	1.6
Heparin	4.0	1.6
Comorbid diseases or conditions	4.0	1.6
Hematological parameters	4.0	1.6
Physical/physiological parameters	4.0	1.6
Stress	4.0	1.6
Transplant rejection	3.0	1.2
Cardiopulmonary resuscitation	3.0	1.2
Nutritional parameters	3.0	1.2
Biochemical parameters	3.0	1.2

Descriptor Category	n	%
Rehabilitation	3.0	1.2
Illness experience	3.0	1.2
Recirculation	2.0	0.8
Urea kinetic modeling	3.0	0.8
Dialysis prescription	2.0	0.8
Residual renal function	2.0	0.8
Pancreas/Kidney transplant	2.0	0.8
Anticoagulation	2.0	0.8
Blood pressure	2.0	0.8
Immunological parameters	2.0	0.8
Drug pharmacokinetics	2.0	0.8
Instrument evaluation or testing	2.0	0.8
Education	2.0	0.8
Social functioning/parameters	2.0	0.8
Adaptation	2.0	0.8
Tunnel infections	1.0	0.4
Blood sampling	1.0	0.4
Central lines	1.0	0.4
Access surgery	1.0	0.4
Renal transplant function	1.0	0.4
PTLD	1.0	0.4
Bacterial organisms	1.0	0.4
Growth hormone	1.0	0.4
Primary health care	1.0	0.4
Iron over load	1.0	0.4
Sleep disorders	1.0	0.4
Biochemical parameters	1.0	0.4
Organ donation	1.0	0.4
Cognitive function	1.0	0.4
Coping	1.0	0.4
Helplessness	1.0	0.4
Recreation	1.0	0.4
Mood state	1.0	0.4

Table 4.2. Descriptor categories for "independent variable", and the frequency and percentage of research items classified for each category.

Descriptor Category	#	%
Medication administration	17.0	15.6
Dialysis system/modality	16.0	14.7
Erythropoietin	12.0	11.0
Dialysis prescription	7.0	6.4
Immunosuppression	7.0	6.4
PD catheters	7.0	6.4
Antibiotics	7.0	6.4
Physical/physiological parameters	4.0	3.7
Education	4.0	3.7
Comorbid diseases/conditions	4.0	3.7
Pancreas-kidney transplant	2.0	1.8
Adequacy of dialysis	2.0	1.8
Central lines	2.0	1.8
Cognitive function	1.0	0.9
Mood state	1.0	0.9
Recreation	1.0	0.9
Recirculation	1.0	0.9
Viral infections	1.0	0.9
Tissue typing parameters	1.0	0.9
Risk factors	1.0	0.9
PET	1.0	0.9
Peritonitis	1.0	0.9
Growth hormone	1.0	0.9
Phlebotomy	1.0	0.9
Bacterial organisms	1.0	0.9
Blood sampling technique	1.0	0.9
Hematological parameters	1.0	0.9
Hemodialysis access	1.0	0.9
Anemia	1.0	0.9
Anticoagulation	1.0	0.9
Behavior modification	1.0	0.9

Table 4.3. Descriptor categories for "dependent variable", and the frequency and percentage of research items classified for each category.

Descriptor Category	#	%
Biochemical parameters	43.0	10.0
Mortality/morbidity	28.0	6.5
Hematological parameters	26.0	6.1
Physical/physiological parameters	20.0	4.7
Peritonitis	19.0	4.4
PD complications	19.0	4.4
Comorbid diseases/conditions	16.0	3.7
Bacterial organisms	14.0	3.3
Adequacy of dialysis	12.0	2.8
Exit-site infections	11.0	2.6
Blood pressure	11.0	2.6
PD catheters	8.0	1.9
Dialysis system/modality	8.0	1.9
Hemodialysis complications	8.0	1.9
Infection/sepsis	8.0	1.9
Nutritional parameters	8.0	1.9
Compliance	8.0	1.9
Quality of life	8.0	1.9
Attitudes/beliefs	7.0	1.6
Access complications	6.0	1.4
Residual renal function	6.0	1.4
Renal transplant function	6.0	1.4
Risk factors	6.0	1.4
Tissue typing parameters	6.0	1.4
Drug pharmacokinetics	6.0	1.4
Education	6.0	1.4
Coping	5.0	1.2
Immunological parameters	5.0	1.2
Urea kinetic modeling	5.0	1.2
Dialysis prescription	4.0	0.9
Transplant rejection	4.0	0.9

Descriptor Category	#	%
Immunosuppression	4.0	0.9
Heparin	4.0	0.9
Blood transfusions	4.0	0.9
Social parameters/functioning	4.0	0.9
Adaptation	4.0	0.9
Stress	4.0	0.9
Illness experience	3.0	0.7
Employment	3.0	0.7
Cardiopulmonary resuscitation	3.0	0.7
PD tunnel infections	3.0	0.7
Recirculation	2.0	0.5
Access surgery	2.0	0.5
Change of dialysis modality	2.0	0.5
Cold ischemic time	2.0	0.5
Socioeconomic status	2.0	0.5
Erythropoietin	2.0	0.5
Medication administration	2.0	0.5
Fluid gain	2.0	0.5
Instrument evaluation/testing	2.0	0.5
Cognitive function	2.0	0.5
Social support	2.0	0.5
Life-style	2.0	0.5
CAVH(D)	1.0	0.2
PTLD	1.0	0.2
Biopsies	1.0	0.2
Pain	1.0	0.2
Cost of treatment	1.0	0.2
Antibiotics	1.0	0.2
Anticoagulation	1.0	0.2
Primary healthcare	1.0	0.2
Healthcare practices	1.0	0.2
Viral infections	1.0	0.2
Growth hormone	1.0	0.2
Sleep disorders	1.0	0.2
Neuropsychological function	1.0	0.2
Depression	1.0	0.2

Descriptor Category	#	%
Organ donation	1.0	0.2
Rehabilitation	1.0	0.2
Helplessness	1.0	0.2
Uncertainty	1.0	0.2
Expectations	1.0	0.2
Self-esteem	1.0	0.2
Mood state	1.0	0.2

Quality of Research

Results pertaining to the assessment of quality of research are presented as frequencies and proportions of the research items classified. The sample for quality of research evaluation does not include the 9 research items with qualitative data collection techniques. Therefore n=185 for evaluation of quality of research. Results are presented for both the body of research items evaluated, and for the items published in each of the years 1990 through 1992. Finally, common problems in research methodology and presentation for the sample items will be identified. Appendix H contains RAC quality classifications and identification of problem areas for each item in the sample.

Quality of Research of the Total Sample

The majority of studies (n=168, 90.8%) in the sample (n=185) were classified as average for quality of research. There was one item (0.5%) rated as superior, and 16 items (8.6%) classified as below average. Total scores (uncorrected for N/A items) ranged from a low of 60 to a high of 214. See Figures 4.6 and 4.7.

The percentage of research studies classified for the specific quality rating categories appears consistent through the years analyzed. Research classified as "Average" was 91.5% of the total for 1990, 89.8% of the total for 1991, and 90.9% of the total for 1992. See Table 4.4 for a comparison of the proportions for classified items by year.

Figure 4.6. Distribution of RAC scores (uncorrected for N/A items) for the total sample (n=185), and for each of the years 1990, 1991, and 1992.

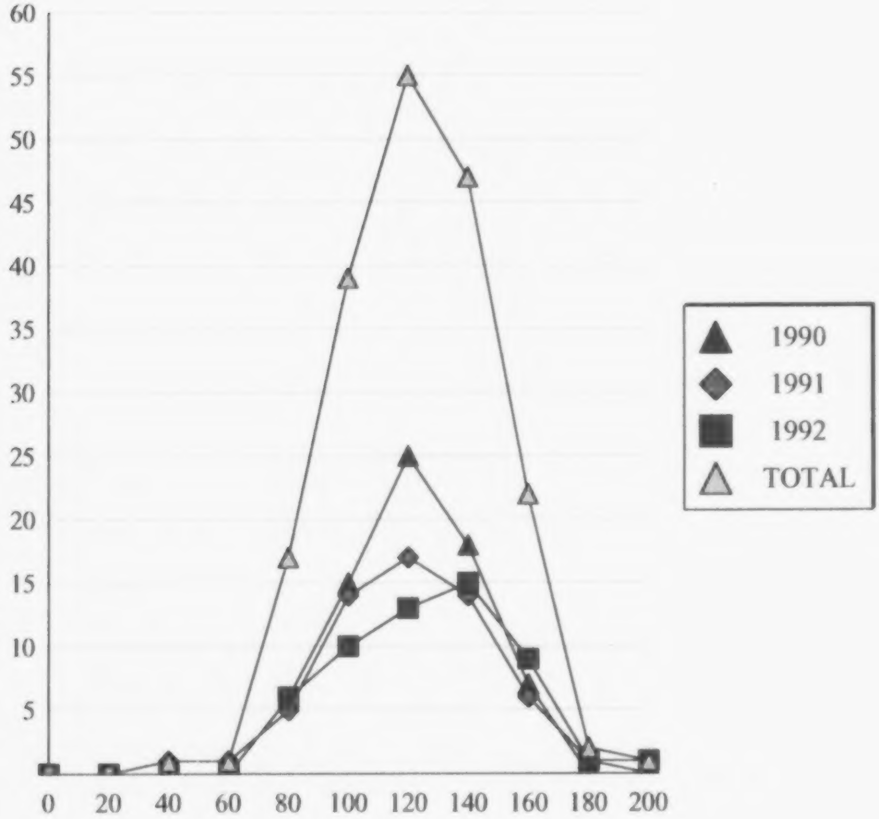
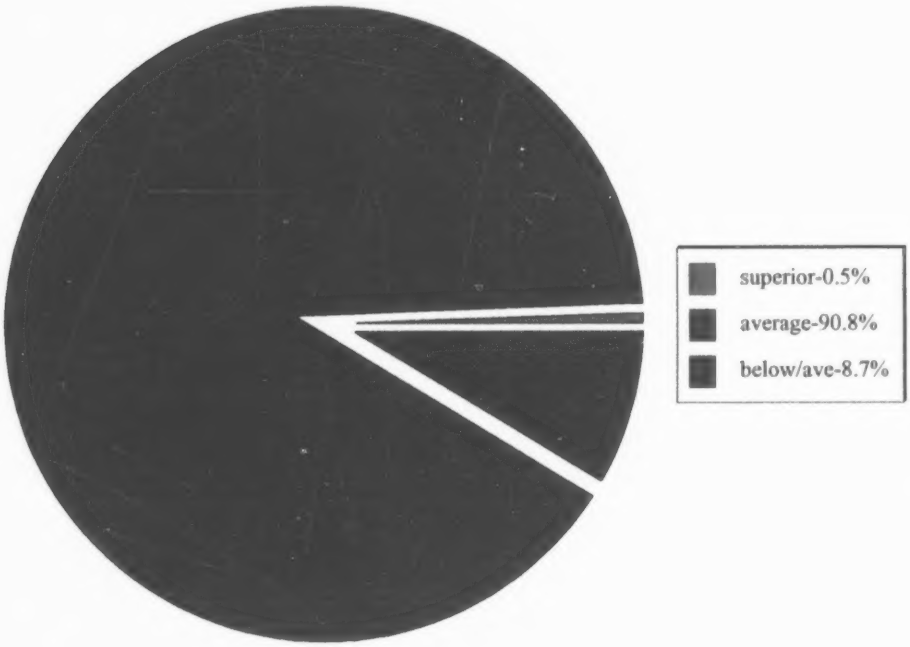


Table 4.4.

Percentage of research items classified for "quality of research"; for the total sample (n=185), and for each of the years 1990, 1991, and 1992.

	YEAR-1990		YEAR-1991		YEAR-1991		TOTALS	
RATING	#	%	#	%	#	%	#	%
Superior	0.0	0.0	0.0	0.0	1.0	1.8	1.0	0.5
Average	65.0	91.5	53.0	89.8	50.0	90.9	168.0	90.8
Below Ave.	6.0	8.5	6.0	10.1	4.0	7.3	16.0	8.7
TOTALS	71.0	100.0	59.0	100.0	55.0	100.0	185.0	100.0

Figure 4.7. Percentage of research items (n=185) classified for each of the "quality of research" categories.



Common Problems in Research Methodology and Presentation

The RAC category scores were analyzed to identify problems with research methodology and presentation common to the group of research items. Table 4.5 presents the proportions of quality classification for each RAC category. The classifications of interest in this analysis were the proportions of classifications as "below average" for each of the RAC categories. The proportion of "below average" quality classifications for the total RAC was 8.7%.

A comparison of the category classification frequencies with the RAC proportion of 8.7% revealed 4 areas where there was very low equivalence between classification frequencies. These areas were Problem (30.3% classified as below average), Literature review (50.8% classified as below average), Subjects (81.1% classified as below average), and Instruments (91.4% classified as below average). There were two other categories: Abstract (18.9% classified as below average), and Design (21.1% classified as below average) where the differences in proportions were not as great, but where there was still a substantial difference from the RAC proportion of 8.7%.

Summary

A total of 194 nephrology nursing research reports were described and 185 reports were evaluated for quality of research. Classification by research design was as follows: 46% evaluative; 22% epidemiological; 20% survey; 11% exploratory-descriptive; 1% methodological; and 0.5% experimental. There were no historical

Table 4.5.

Percentage of research items classified as below average, average, and superior for both the total RAC, and the RAC categories.

	QUALITY OF RESEARCH CLASSIFICATION					
Category	Below Ave.		Average		Superior	
	#	%	#	%	#	%
RAC Total Score	16.0	**8.7**	168.0	90.8	1.0	0.5
Title	4.0	2.2	142.0	76.7	39.0	21.1
Abstract	35.0	18.9	131.0	70.8	19.0	10.3
Problem	56.0	**30.3**	129.0	69.7	0.0	0.0
Literature Review	94.0	**50.8**	83.0	44.9	8.0	4.3
Subjects	150.0	**81.1**	33.0	17.8	2.0	1.1
Instruments	169.0	**91.4**	13.0	7.0	3.0	1.6
Design	39.0	21.1	134.0	72.4	12.0	6.5
Data Analysis	10.0	5.4	99.0	53.5	76.0	41.1
Discussion	14.0	7.6	145.0	78.3	26.0	14.1
Form & Style	10.0	5.4	153.0	82.7	22.0	11.9

designs used in this sample. Of the 194 studies, 42.3% pertained to peritoneal dialysis, 29.4% to hemodialysis, 18.0% to renal transplantation, 7.2% to end-stage renal disease in general, and 3.1% to acute renal failure in general.

Content analysis for the major topic of the research identified 62 descriptor categories. The most frequent research topics were: pediatrics, erythropoietin, mortality/morbidity, PD complications, peritonitis, and quality of life. Content analysis for independent variables resulted in 31 descriptor categories. The most frequent independent variables were medication administration, dialysis system/modality, and erythropoietin. The most frequent dependent variables categorized through content analysis pertained to biochemical parameters, physical/physiological parameters, peritonitis, PD complications, and comorbid diseases/conditions.

Quality of research was determined through administration of the "Research Appraisal Checklist" to sample items with quantitative data collection methods. The majority of studies in the sample were rated "average" for quality of research (90.8%). One study (1.9%) was rated "superior" from a sample n=185. Sixteen studies (8.6%) were evaluated as "below average" quality. Analysis of the RAC category scores was conducted in order to identify methodological and presentation problems common to the total sample. Common problems were found to exist in relation to the RAC content for research problem. literature review, subjects, and instruments.

V. DISCUSSION AND CONCLUSIONS

The purpose of this chapter is to discuss the findings and present the conclusions of this research study. The results of this project are summarized and discussed in relation to the research problem, the literature review, and the previous research about nephrology nursing research literature. This is followed by a general discussion of both the research findings, and the limitations of the study. Implications for nursing practice, research, and education conclude the chapter.

Discussion

Findings in Relation to the Research Problem

The basis for conducting this research study was that nurses needed to be able to both identify relevant research studies, and evaluate them for usefulness prior to making decisions about incorporating research findings into practice, research, or education. This study attempted to identify nephrology nursing research literature for the years 1990 through 1992, and provide a concise description of the identified research. The descriptors were selected on the basis of how well they would serve to differentiate the research in relation to the diverse components of nephrology nursing practice. Therefore, the summaries of the individual studies provide an aid in the identification of research relevant to nurses' particular interests or area of nursing practice.

The quality of research ratings indicate to the reader of the research a description of quality for the research process as it was described in the research report. The quality classification is not a determination of usefulness of research findings. It is however, a basis from which nurses can formulate a synthesis of quality of research findings; relevance to practice, and significance in relation to existing knowledge. It is this synthesis which will determine the "usability" of research findings.

Journal editorial limitations may have resulted in research items being classified with a lower quality rating than might have been obtained had the original research report been evaluated. This does not detract from the usefulness of the quality ratings obtained in this study. It is the published report that serves as the vehicle for dissemination of research findings and recommendations. Therefore, it is the published reports which must be evaluated for quality. If there are omissions or errors in these reports, it will impact on nurses' abilities to determine the usefulness of the findings. Research journals should limit article length by encouraging concise reporting instead of deletion of important information.

It is commonly held that research reports published in refereed journals are of a higher quality than those published in non-refereed journals. In this study, of the 16 research articles classified as "below average quality", 9 were published in a total of 4 refereed journals. Thus, the majority of below average research reports were found in refereed publications; indicating that even a rigorous selection process does not necessarily guarantee the publication of superior research. See Appendix B for identification of refereed journals. The source for this identification was Ulrich's

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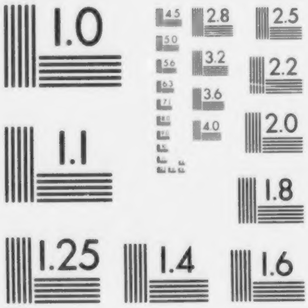
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1.25
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1.6

International Periodicals Directory, as many of the journals were not available for examination.

The description of the body of research reports serves as a general description of the body of knowledge in relation to nephrology nursing research literature. This helps to place individual research reports in a context of what research has been conducted. Topics and content areas of research that were deemed important by the research community from 1990 through 1992 can be deduced. The description also served to identify common problems with the research process.

Findings in Relation to the Literature Review

The review of the literature discussed three methods of describing published research: overviews or surveys, analysis, and meta-analysis. Each of these methods could be used to describe a body of research reports, however each method had a different purpose and employed different techniques for determining research descriptions. Overviews of research use neither research methods nor variables. Meta-analysis integrates and analyzes the research findings of multiple primary studies, as opposed to describing the research studies. The analysis of research literature was defined as a method of describing a body of published research through the utilization of a research methodology. One purpose of this project was to identify and describe both individual research reports, and the total body of research in the sample; using specified variables. Therefore, for this project, analysis of research was the appropriate method of describing nephrology nursing research literature.

The second purpose of this study was to determine quality of research for both individual sample items, and the total sample of research articles. In this project, quality of research was defined as the degree of credibility attributed to the research process, or the degree to which the research process was deemed to be adequate by the scientific community. In the literature review research reviews were discussed in relation to the product of the review process; which is an analysis of what is known about a topic of interest. The scope of a research review was therefore much broader than the scope of an evaluation of quality of research.

The research critique was described as a critical assessment of a single research report. Critical assessment involved the use of increasingly complex cognitive skills; with the ultimate goal of synthesis, or the drawing of conclusions based on multiple sources. Evaluation was defined as part of the research critique process. Evaluation of research was defined as the use of internal standards to give a judgement about the parts and relationships within a research study. Thus, the determination of quality of research, when defined as the degree of credibility attributed to the research process, was a form of evaluation by internal standards. Therefore, the evaluation of quality of research was a component of the process of the research critique.

The findings of this study are consistent with the process of evaluation by internal standards to give a rating of quality of research. The RAC was a criterion based instrument with items pertaining to the parts, and relationships between parts of a research report. Decision validity was an important part of construct validity for this instrument, as the end product of the instrument was a judgement of quality. Thus, accuracy of the instrument in making judgements was crucial. Although the sample of research items used in for the decision validity calculations was small (n=13), there was a moderate amount of evidence that the RAC did not accurately judge quality of research.

Duffy (1988) showed evidence for high levels of content validity for the RAC. It was important to show that the items on the instrument were relevant standards for judging research quality. It was equally important to show evidence for construct validity by demonstrating that the instrument did what it claimed to do (accurately classify for quality of research). This had not been addressed in previous studies where the RAC was used for data collection. The low decision validity found in this study, coupled with the lack of previous decision validity testing, made it difficult to formulate conclusions about the nephrology nursing research literature, as accuracy of the quality classifications could not be supported.

The literature review found that concerns had been expressed about the RAC in relation to: equivalency of weighting of the various RAC items, whether the RAC evaluated the research quality or the writing quality, and that subjective assessments for research items tended to be lower than RAC classifications. The findings of this study suggested that the cut scores were not set appropriately for the scoring of the RAC items. This issue had not been previously discussed in the literature pertaining to the use of the RAC. To identify the degree to which the cut score settings influence the accuracy of the quality ratings, further decision validity testing needs to be conducted, using both larger samples and several different criterion groups.

Findings in Relation to Previous Research

Research Design

Evaluative research designs comprised 46% of the total number of items (n=194), followed by epidemiological (22%), survey (20%), exploratory-descriptive (11%), methodological (1%), and experimental (0.5%). Molzahn (1992,1993) classified the research designs in the nephrology nursing research literature for 1979 - 1989 as follows: descriptive (34.9%), methodologic (4.9%), analytical observational (45.4%), experimental (14.1%), and historical (0.7%). Due to the use of different classification schemes, comparisons of frequencies for the specific research designs were impossible.

General comparisons between this study and Molzahn's (1992,1993) were made. Nonexperimental research comprised the majority of items in both studies. Molzahn described a lack of studies that evaluated the efficacy of interventions. In this study, items with evaluative research designs were the most frequent. Although a considerable number of them related to the evaluation of therapies that may be considered medical or biochemical, a significant number addressed nursing interventions. Of the evaluative research that was clearly related to nursing practice, most related to the technical aspects of performing dialysis treatments

Molzahn (1992,1993) further noted a lack of historical research and a need for more research that tested measurement instruments. The lack of historical research appeared to persist. There were no items in this study using historical research designs. Only two items in this project used methodological designs, reflecting a continuing need for the development and testing of measurement instruments for use with ESRD patients.

Clinical Area of Practice

Clinical areas of nursing practice addressed by the research items in this study were peritoneal dialysis (42%), hemodialysis (29%), renal transplantation (18%), end-stage renal disease in general (7%), and acute renal failure in general (3%). Molzahn (1992,1993) found these proportions to be hemodialysis (48.2%), peritoneal dialysis (23.9%), renal transplantation (12.3%), and end stage renal disease generally (15.5%). The main focus of nephrology nursing research appears to have shifted from hemodialysis to peritoneal dialysis.

The increase in research related to peritoneal dialysis may be due to several factors. First, peritoneal dialysis is a relatively new therapy. The growth in numbers of patients utilizing this dialysis modality has resulted in increasing numbers of nurses involved in providing care. The number of nurses identifying research questions, and conducting the research is greater now than in the past. Second, the long term effects and complications of peritoneal dialysis are becoming apparent. Nursing research is being conducted to prevent or delay these effects. For example, research about peritoneal dialysis catheter loss from infections ranges from studies identifying risk factors for catheter infections, to evaluating infection rates associated with a variety of catheter care procedures.

There has been a small increase (to 18%) in the proportion of nephrology nursing research relating to renal transplantation. This proportion may be artificially high, as many of the items in this study relating to renal transplantation reflected evaluations of drug therapy regimes. There is a continuing need for nursing research relating to this treatment modality. The nursing care of renal transplant patients has many issues and concerns specific to this area of nephrology nursing.

Major Topic of the Research

The six most frequent topics for the research in this sample were pediatrics (7.7%), erythropoietin (6.9%), mortality or morbidity (6%), peritoneal dialysis complications (5.2%), peritonitis (4.8%), and quality of life (4%). The most frequent topics in Molzahn's (1992,1993) study were physiological health status (5.7%), biochemical parameters (4.5%), peritonitis (4.3%), compliance (4.1%), adaptation (3.9%), and urea/creatinine clearance (3.9%). The topic of peritonitis is the only one that is similar between the two groups of frequent research topics. PD complications other than peritonitis (tunnel infections, membrane failure) have evolved as an area of interest for nurse researchers.

In this study, nephrology nursing research addressing the care of pediatric patients was the most frequent topic of research. This probably reflected the need for knowledge about providing renal replacement therapy to children. This need has developed in relation to the increasing numbers of children receiving both maintenance dialysis, and renal transplants. The body of knowledge about adult patients does not necessarily equate to the pediatric patient. The research ranged from investigating dosages and side effects of drug therapies, investigating issues of growth in children with renal failure, to describing the illness experience of children with end-stage renal disease.

Erythropoietin is a drug therapy that is only several years old, thus the number of research studies looking at dosing, side effects, and implications for practice were numerous. The time frame for this project coincided with the majority of these initial studies. The number of studies about erythropoietin should decrease over the next several years, as the implications for use in the dialysis population are identified.

Research looking at patient or treatment outcomes was a frequent topic for nephrology nursing research. There is increasing emphasis on providing patients with the most efficient and cost-effective dialysis therapy. The costs related to hospitalizations, training patients for peritoneal dialysis, and changing dialysis modalities are becoming important factors in determining appropriate dialysis treatments. Many of the studies looked at patient mortality and morbidity in relation to hemodialysis versus peritoneal dialysis; or between various systems of peritoneal dialysis. Another areas of interest was geriatric patients and the study of treatment outcomes in this group of patients.

It was interesting that studies relating to quality of life had become one of the most frequent topics for research. As with assessment of patient outcomes, assessment of quality of life provides an indicator of the relative success of a particular dialysis modality. Themes in the research related to quality of life included levels of functional and vocational rehabilitation.

The research topics of adequacy of dialysis (2.8%), physical or physiological parameters (1.6%), biochemical parameters (0.4%), and compliance (2%) were present, but less frequent than found by Molzahn (1992,1993). Many of the topics with very low frequencies related to the emotional or psychological status, or specific physiological symptoms of patients; examples being mood states, helplessness, adaptation, coping, and sleep disorders. All of these topics are of concern within the practice of nephrology nursing. Both instruments for measurement and specific interventions need to be developed and tested.

Independent Variable

Molzahn's study (1992,1993) did not address the identification or analysis of independent variables in nephrology nursing research. In this study, the most commonly used independent variables pertained to medication administration, dialysis systems or modalities, and erythropoietin. The frequency of items evaluating medications may be reflective of the degree to which nurses are involved in non-nursing research. Many of the items in this group looked at efficacy and/or identification of side effects of particular drugs, rather than nursing issues relating to the administration of the drug or monitoring of the patient.

The drug erythropoietin was classified separately from medication administration because of the large number of items relating to it. Although some of the items were directly related to nursing care of patients receiving erythropoietin, there were others that were non-nursing in nature. This is again reflective of nurses involved in the conduct of research relating to medical or biochemical issues.

The high frequency of dialysis systems or modalities used as independent variables is reflective of the investigations into efficacy of these therapies. There appears to be a search for the identification of the best types of treatment for specific types or groups of patients, i.e.. pediatric patients, geriatric patients, diabetic patients. As discussed earlier, this type of research may be driven by economic factors.

Dependent Variable

In this study, the dependent variables were most frequently related to biochemical parameters (10%), mortality/morbidity (6.5%), hematological parameters (6.1%), physical or physiological parameters (4.7%), peritonitis (4.4%), peritoneal dialysis complications (4.4%), and comorbid diseases and conditions (3.7%). The most frequent dependent variables identified by Molzahn (1992,1993) were physiological health status (5.4%), biochemical parameters (5.2%), compliance (4.4%), exit-site infection (4.4%), and urea/creatinine clearance (4.4). Biochemical parameters and physical or physiological parameters are present in both studies as frequent dependent variables. Adequacy of dialysis (2.8% or 12 items), exit-site infections (2.6% or 11 items), and compliance (1.9% or 8 items) as dependent variables were moderately frequent in this study.

The high frequencies of dependent variables pertaining to mortality/morbidity, and comorbid diseases and conditions, are reflective of the high numbers of studies addressing dialysis modality or system outcomes. The frequent use of hematological parameters was in relation to the body of research about erythropoietin. Serum hemoglobin, hematocrit, and clotting parameters were commonly measured in these studies.

Dependent variables relating to peritoneal dialysis were related to three major categories: peritonitis, PD complications, and exit-site infections. Combined, these three categories of dependent variables account for 11.4% of the total number of dependent variables identified in this project. Research utilizing these categories of variables included: research about patient, modality, and catheter outcomes; efficacy of antibiotic therapies; and risk factors for developing infections or complications. There were research items using these types of variables that were clearly more medical or biochemical in nature than they were related to nursing. However, as described earlier, there were significant numbers of studies that were directly related to nursing care of patients receiving peritoneal dialysis.

The dependent variables that were found least frequently were again related to emotional and psychological issues, and to specific physiological conditions. These included mood states, self-esteem, expectations, uncertainty, helplessness, depression, viral infections, sleep disorders, and pain. All of these variables are of interest to nephrology nurses, and further research to develop measures and evaluate interventions are needed.

Quality of the Research

Molzahn (1992,1993) found that 79% of the items evaluated for quality were ranked as high, 20.6% ranked as moderate, and 0.4% ranked as low quality. She commented that the instrument she used to evaluate quality appeared to give higher ratings than would be given on subjective evaluation of the research items. In this project, a different instrument of research quality, the "Research Appraisal Checklist" was used. Results for quality of research in this study were 90.8% rated as average, 8.6% of the items rated as below average quality, and 0.5% of the items rated as superior quality.

The differences in the quality of research findings between the two studies are due primarily to the different instruments used in evaluation of quality, not due to a major shift in general research quality by nephrology nurses. Intrarater and interrater reliabilities for the RAC were high at P_o values ranging from 0.95 to 1.0. Thus the items in this study were consistently classified. Decision validity in this study was poor with P_o=.46 and k =.14. These statistics indicated that the proportion of nonchance agreements in quality ratings between the criterion groups was only .14. A k value of .75 was desired. Thus, in this study, the RAC classifications may be inaccurate.

It is probable, that in this study the quality ratings for the items are skewed to giving average ratings. The decision validity data indicated that items classified as average by the independent evaluators were also scored as average by the RAC. The RAC correctly classified only 1 out of 4 items scored below average by the independent evaluators, rating the other 3 items as average. Of the 4 items rated superior by the expert evaluators, the RAC classified all of them as average. Thus, items that would otherwise be evaluated as either superior or poor are rated as average.

This skewing of the quality evaluations is primarily due to lack of identified scoring criteria for the instrument, and the subsequent problems with appropriate cut-scores. For this study, it is probable that the cut-scores were set both too high for differentiating "superior" from "average", and too low for differentiating "average" from "below average". Thus, those items classified by the RAC as either "below average" or "superior" are probably accurately classified. It is the group of items classified as average, when in fact they are not, that presented the problem in instrument validity for this study. If the RAC is to be used for quality of research evaluation in the future, measures should be taken to ensure that the cut-scores used are appropriate for the criteria used in scoring the instrument items.

In this study, the distribution of RAC scores was unimodal, and a close approximation of a normal distribution. It is possible that cut scores could be determined through calculation of the median and standard deviation for the distribution of RAC scores; using 1 or 2 standard deviations as the cut-off points for differentiating degrees of research quality. This implies that the cut scores would be different for each occasion (or set) of RAC scores. Further research is needed to administer the RAC to a variety of research samples, and examine the distributions of the numerical scores. If the distribution of scores is consistently unimodal, then a mechanism for determining cut scores may be possible.

When multiple raters administer the RAC, both within and between research studies, there are problems with consistency of criteria used for scoring the individual RAC items. The degree of subjectivity in the administration of the RAC allows for a wide variation in scoring between raters, thus requiring considerable work to obtain agreement for the scoring process. In effect, there is an informal "guide" for how the RAC items should be scored. In this project there was high consistency in RAC classifications between raters; however, the resulting numerical scores did not "fit" with the pre-set cut scores.

If the set cut scores are to be used to classify quality of research, then a standardized guide for item administration is needed. Users of the RAC need more objective criteria for scoring, as opposed to the current instructions which merely state that an item is "met" versus "partially met" versus "fully met". Intrarater and interrater reliability calculations are essential when utilizing the RAC. This is the best method of providing evidence for consistency of quality classifications.

Common Problems in the Research

Molzahn (1992,1993) identified the following components of the research report where significant numbers of problems were reported: conceptual framework, research design, methodology, sampling, and presentation of the papers. Analysis of the RAC category scores identified four general problem areas in the body of research in this study. These areas related to the problem, the literature review, the subjects, and the instruments. Although the problem areas were classified differently between the two projects, the nature of the concerns appeared to be similar.

The RAC category of "problem" in a research report referred to the introductory part of the research report where the problem and research questions were outlined and discussed, the conceptual framework was described, and the justification for conducting the research was presented. In many of the items in this project, a majority or all of these components were missing. Often, after an introductory paragraph, the report continued with methodology and results.

It is possible that the missing components in the identification of the research purpose and questions were a result of journal editorial policy. However, it is important for the readers of research to know what the problem, research questions, and theoretical context were; to put the subsequent research methodology and results into perspective. Some of the papers inappropriately presented the research problem where there should have been a discussion of the results.

The RAC category of "literature review" report referred to the portion of the introductory section where previous research findings were presented, and the research problem and questions were described in relation to the previous findings. This part of the research report was missing in some items in this project, and marginally done in others. A total of 50.8% of the items evaluated scored poorly in this area.

A greater emphasis needs to be made to review the literature when reporting research, as the significance and interpretation of both the research itself and the subsequent findings are dependent on an understanding of the body of knowledge about the research topic. It cannot be assumed that the readers of the research will possess this knowledge. As with presentation of the research problem, literature reviews may be limited due to journal editorial policy, rather than exclusion by the author(s) of the research.

The "subjects" category in the RAC related to the identification of the study population, the sampling methods, and description of the sample. Of the total number of items classified for quality in this study, 81.1% were rated as poor in this category of the research report. Usually, the population description was either missing or very brief. Sampling methods were usually omitted, although inclusion/exclusion criteria might have been stated. A description of the sample was usually given.

The description of the population and sample, and the sampling methods are important components of the research report. Readers of research need this information to determine if the population of subjects is the same or similar to the one they may have questions about. Second, the readers must determine the degree of generalizability of the presented research findings to the population. Thus, the descriptions of population and sample, and the sampling methods are essential for the process of determining research "usability". Authors of research should ensure that information about the study population and sample are a part of the report.

The category of "instruments" referred to the description of data collection instruments and presentation of validity and reliability information. This was missing or poorly done in 91.4% of the items with quantitative data collections techniques. The assumption was made that if data are collected, there should be a mechanism or instrument for that data collection. Thus, validity and reliability of data collection was relevant for the total n=185 of the items evaluated for quality of research.

It was surprising that discussions about reliability and validity of data collection were missing from a majority of the items in this study. It was the validity information that made the argument about whether the research study actually measured what it had intended to. The reliability information argued that measurement was consistent throughout the data collection process. Readers of the research need this information in terms of determining appropriateness and usablility of the research findings.

General Discussion of Research Findings

The volume of nursing research described by Molzahn (1992, 1993) appeared to be steadily increasing over the years, to a high of 41 papers identified for 1989. In this study, the volume of articles appears to have peaked in 1990 with 73 items, and then declined with 61 items for 1991 and 60 items for 1992. The difficulties encountered in both the identification and retrieval of sample items makes the yearly figures subject to a measure of inaccuracy. Additionally, the differences between these totals are too small to make any statements that are generalizable to the total population.

Thus, statements about yearly volumes of nephrology nursing research have to be confined to the study sample.

The topics and designs of research appear to vary over time in relation to a variety of advances in the treatment of patients with end-stage renal disease. The most significant factors that appear to be impacting the research from 1990 to 1992 are: the introduction of erythropoietin for treatment of anemia, the growth within the modality of peritoneal dialysis, and issues relating to costs and benefits of the different dialysis modalities and systems. Areas of nursing research relating to emotional, psychological, and cognitive areas of patient care emerge as scattered studies, with only one or two studies for any one specific topic over the total 3 year period.

Nephrology nurses appear to be actively involved in research that does not directly relate to nursing care. There are "teams" of doctors, nurses, and others publishing multiple research reports which deal primarily with the evaluations of clinical dialysis issues or medications. The findings of these studies relate to patient care as defined in the inclusion criteria, however they are not "truly" related to the nursing care of patients. Perhaps the nurses involved in this type of research will begin to investigate nursing care issues arising out of the non-nursing research findings.

Limitations of the Study

Several problems were noted in relation to reliability and validity of the instruments used in this study. The RCI had acceptable content validity, however there were unacceptable interrater and intrarater reliabilities (for one rater) for three of the measured variables. Measures taken to produce consistent classifications consisted of having the sample items rescored for the three variables by the rater with high levels of intrarater reliability. These actions resulted in descriptive data that were reliable.

Reliability scores for the RAC were high for both interrater and intrarater calculations. The decision validity testing revealed a low level of probability that the quality classifications were nonchance. It must be kept in mind that the sample used for this calculation was very small (n=13) and thus subject to error. However, it does appear that problems intrinsic to the administration of the RAC were impacting the validity of the classifications.

The lack of standardized instructions for the determinations of the numerical ratings, meant that the scoring of the individual RAC items was open to subjective interpretations. Although there was consistency in scoring between raters in this study, there was no proof that there was consistency in item ratings with other users of the instrument in other studies. Utilizing standardized cut-scores to classify research quality with this method of item scoring appears to have resulted in inappropriate cut-scores. There was poor differentiation between quality classifications. Thus the quality ratings were grouped in the "average" classification.

Interpretation of the quality ratings in relation to the individual studies has to be done within the limitations of the classifications. It is probable that items scored as superior or poor are accurate. However, there are probably a number of items classified as average which are in actuality improperly classified.

The problems encountered with sample item identification and retrieval have limited the generalizability of the study. The descriptions of individual research items are relevant and valid. The description of the body of research must be considered a description of the sample items only, and not inferred to describe all nephrology nursing research published in 1990 through 1992. The thoroughness of the item identification and retrieval procedures does suggest that the sample is relatively comprehensive, thus increasing the usefulness of the item summaries.

Implications for Nursing Practice

Nurses can utilize the findings of this study to identify research studies relating to particular problems or areas of interest. It must be cautioned that the findings of the studies described in this report must not be implemented into practice unless a careful synthesis of the usefulness of the research is conducted.

Implications for Nursing Research

Implications for further research are associated with both the methodology of this type of research study and analysis of descriptive variables. There needs to be development and testing of an instrument to classify research quality. To date, there have been significant problems with the validity of instruments used in this type of descriptive research. As previously described, potential topics for research relating to the RAC are the development of instrument administration guidelines, and development of a schema for determining optimal cut scores.

The identification and description of nephrology nursing research literature should continue. The result of multiple descriptive studies is a comprehensive data base of existing research in the area of nephrology nursing. Nurse researchers can refer to this body of information when formulating research questions, as it will provide them with a listing of research related to their area of inquiry. This data base will also indicate if there is no research available.

Secondary analysis of the data from this study, or future descriptive studies, could include analysis of the following variables: a nurse as primary or secondary author of the research item in relation to any other descriptive variables used in the study, analysis of independent and dependent variables in relation to research design, sources of funding for the research, or analysis of research design in relation to area of clinical practice. The research could be further categorized to differentiate between research related to the dialysis procedure versus research related to the dialysis patient. Any of these analyses would serve to enhance the description of the literature.

Specific areas where there is a distinct need for further research include, but are not restricted to: mood states, recreation, rehabilitation, helplessness, coping, cognitive function, organ donation, sleep disorders, primary health care, issues related to access surgery, patient education, and issues arising from study of the illness experience of the patients. In particular, there is still a lack of research related to the nursing care of renal transplant patients.

Nursing students and educators can utilize the findings of this research to identify nephrology nursing research literature. Nursing students, through critique of the research articles, help to select those studies, and subsequent findings for incorporation into education programs. This facilitates the incorporation of the best research, theoretical, and clinical concepts into nursing education programs. The incorporation of research-based findings into nursing education curricula promotes the use of nursing interventions that are research-based.

Students, researchers, and educators can utilize the RAC as a guide when both planning research (writing the proposal), and when writing research reports. These guidelines would help to ensure completeness and clarity of the research report and findings. Thus, higher standards for the dissemination of research findings would be encouraged.

Conclusions

This study described nephrology nursing research literature published in 1990 through 1992. The study variables of research design, clinical area of nephrology nursing practice, topic of research, independent variables, dependent variables, and quality of research provided a concise description of the studies. This description allows nurses to identify existing research in relation to either research problem, or general area of nursing care. The description of the body of research serves to identify commonalties and problems in relation to the conduct of nephrology nursing research. Generalizability of the findings of this study are limited due to sampling difficulties. Quality of research classifications should be interpreted cautiously in view of low decision validity calculations. Further research is necessary in relation to numerous areas of nursing care, further description of the research itself, and in relation to the development of a quality of research instrument with acceptable construct validity.

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APPENDIX A

Inclusion Criteria Checklist

Inclusion Criteria Checklist

Item # _____

Rater: __________

Date: __/__/__

Population Definition:

The study population consists of books, monographs, dissertations, or articles contained in a major journal; written in English; authored or co-authored by a nurse; used human subjects; and pertained to the care of individuals with acute or chronic renal disease. Patient care is defined as including activities that involve assessment, intervention or interaction with a patient with the objective of resolving or alleviating an actual or potential health problem. Master's theses will be included if they are readily available. For this study, publication will have occurred from 1990 through 1992.

Criteria Checklist:

_____ 1. Item was published in 1990, 1991, or 1992.

_____ 2. Item is either a book, monograph, dissertation, journal article or master's thesis.

_____ 3. Item is written in English.

_____ 4. Item is authored or co-authored by a nurse.

_____ 5. Item uses human subjects.

_____ 6. Item pertains to patient care of individuals with acute or chronic renal disease.

_____ 7. The objective of the study is to resolve or alleviate an actual or potential health problem.

_____ 8. The item is a research report.

APPENDIX B

Sources of Publication of Sample Items with Frequencies per Source

SOURCE (WITH FREQUENCIES) OF SAMPLE ITEMS

(R) = Refereed Journal

JOURNAL	#	JOURNAL	#
American Journal of Kidney Diseases (R)	47	Annals of Clinical and Laboratory Science	1
American Nephrology Nurses' Association Journal (R)	25	American Journal of Infection Control	1
Advances in Peritoneal Dialysis	16	Clinical Transplants	1
Peritoneal Dialysis International	15	American Society of Nephrology Journal (R)	1
American Society of Artificial Internal Organs	14	International Journal of Nursing Studies (R)	1
Dialysis & Transplantation (R)	11	Pediatrics	1
Transplantation (R)	8	Archives of Internal Medicine (R)	1
Transplantation Proceedings (R)	5	Digestive Diseases (R)	1
American Journal of Nephrology	4	Nursing Times	1
Contemporary Dialysis & Nephrology	3	Journal of Clinical and Laboratory Immunology	1
Pediatric Nephrology	3	Journal of Pediatrics (R)	1
Clinical Nephrology	3	Family and Community Health	1
Journal of Urology	2	Artificial Kidney and Dialysis	1
Kidney International	2	Controlled Clinical Trials (R)	1
Canadian Association of Nephrology Nurses and Technicians Journal	2	Scandinavian Journal of Urology and Nephrology	1
Contributions to Nephrology	2	Image (R)	1
Surgery, Gynecology & Obstetrics	2	Health Services Research (R)	1
International Journal of Artificial Organs	2	Antimicrobial Agents and Chemotherapy (R)	1
Journal of Clinical Pharmacology (R)	1	International Journal of Psychiatry in Medicine (R)	1
Critical Care Medicine (R)	1	Nephron	1
Research in Nursing & Health (R)	1	American Journal of Hematology (R)	1
American Journal of Cardiology (R)	1	Unpublished	2
Transfusion	1		

APPENDIX C

Research Classification Instrument

RESEARCH CLASSIFICATION INSTRUMENT

1. Item ID# ________ 3. Date: ___/___/___

2. Rater ________________

---

4. Title of item: ____

____

Authors: 5.	______________________________	Nurse: 6.	Y N
7.	______________________________	8.	Y N
9.	______________________________	10.	Y N
11.	______________________________	12.	Y N
13.	______________________________	14.	Y N
15.	______________________________	16.	Y N

17. Year of publication: ________

18. Reference data: ____

____

____

---

19. Research design:
- _____ Experimental design
- _____ Survey design
- _____ Exploratory-descriptive design
- _____ Historical design
- _____ Epidemiological design
- _____ Methodological design
- _____ Evaluative design

20. Clinical area of practice addressed by the research:
- _____ Hemodialysis
- _____ Peritoneal dialysis
- _____ Renal transplantation
- _____ End-stage renal disease in general
- _____ Acute renal failure in general

21. What are the major topics of the research? ______________________________

____

____

22. List any independent variables:	23. List all dependent variables:
____________________________	________________________
____________________________	________________________
____________________________	________________________

---

24. Quantitative data collection: Y N

APPENDIX D

Research Appraisal Checklist

ITEM ID # _____ RATER ____________________

RESEARCH APPRAISAL CHECKLIST

Instructions:

The Research Appraisal Checklist (RAC) contains 51 criteria which have been ordered under eight major research categories. The RAC is designed to assist you to carefully and systematically assess the worth of a written research report.

In appraising a research report, you are asked to give only one rating to each criterion. Circle the number you think best describes the degree to which each criterion is met in the research report. The numbers in the rating scale range from "1," meaning "Not Met," to "6," meaning "Completely Met." If you rate a category less than a 5 or 6, indicating that you believe it to be Partially or Not Met, write a very brief note summarizing your thoughts about that portion of the report. If your believe that the criterion is not applicable, circle NA.

After completing the ratings of the 51 criteria, sum the category scores and enter them in the appropriate Total Score box. Then, sum scores for all categories and enter the score in the Grand Total box. Finally, write a brief summary citing the major strengths and limitations of the report.

CRITERIA	APPRAISAL RATING	COMMENTS
I. TITLE		
1. Title is readily understood	1 2 3 4 5 6 NA	
2. Title is clear.	1 2 3 4 5 6 NA	
3. Title is clearly related to content.	1 2 3 4 5 6 NA	
CATEGORY SCORE:		
II. ABSTRACT		
4. Abstract states problem and, where appropriate, hypotheses clearly and concisely.	1 2 3 4 5 6 NA	
5. Methodology is identified and described briefly.	1 2 3 4 5 6 NA	
6. Results are summarized.	1 2 3 4 5 6 NA	
7. Findings and/or conclusions are stated.	1 2 3 4 5 6 NA	

CRITERIA	APPRAISAL RATING	COMMENTS
CATEGORY SCORE:		
III. PROBLEM		
8. The general problem of the study is introduced early in the report.	1 2 3 4 5 6 NA	
9. Questions to be answered are stated precisely.	1 2 3 4 5 6 NA	
10. Problem statement is clear.	1 2 3 4 5 6 NA	
11. Hypotheses to be tested are stated precisely in a form that permits them to be tested.	1 2 3 4 5 6 NA	
12. Limitations of the study can be identified.	1 2 3 4 5 6 NA	
13. Assumptions of the study can be identified.	1 2 3 4 5 6 NA	
14. Pertinent terms are/can be operationally defined.	1 2 3 4 5 6 NA	
15. Significance of the problem is discussed.	1 2 3 4 5 6 NA	
16. Research is justified.	1 2 3 4 5 6 NA	
CATEGORY SCORE:		
IV. REVIEW OF LITERATURE		
17. Cited literature is pertinent to research problem.	1 2 3 4 5 6 NA	
18. Cited literature provides rationale for the research.	1 2 3 4 5 6 NA	
19. Studies are critically examined.	1 2 3 4 5 6 NA	

CRITERIA	APPRAISAL RATING	COMMENTS
20. Relationship of problem to previous research is made clear.	1 2 3 4 5 6 NA	
21. A conceptual framework/ theoretical rationale is clearly stated.	1 2 3 4 5 6 NA	
22. Review concludes with a brief summary of relevant literature and its implications to the research problem under study.	1 2 3 4 5 6 NA	

CATEGORY SCORE:

VI. METHODOLOGY

A. Subjects

CRITERIA	APPRAISAL RATING	COMMENTS
23. Subject population (sampling frame) is described.	1 2 3 4 5 6 NA	
24. Sampling method is described.	1 2 3 4 5 6 NA	
25. Sampling method is justified (especially for nonprobability sampling).	1 2 3 4 5 6 NA	
26. Sample size is sufficient to reduce Type II error.	1 2 3 4 5 6 NA	
27. Possible sources of sampling error can be identified.	1 2 3 4 5 6 NA	
28. Standards for protection of subjects are discussed.	1 2 3 4 5 6 NA	

CATEGORY SCORE:

B. Instruments

CRITERIA	APPRAISAL RATING	COMMENTS
29. Relevant previous reliability data are presented.	1 2 3 4 5 6 NA	
30. Reliability data pertinent to the present study are reported.	1 2 3 4 5 6 NA	
31. Relevant previous validity data are presented.	1 2 3 4 5 6 NA	
32. Validity data pertinent to present study are reported.	1 2 3 4 5 6 NA	
33. Methods of data collection are sufficiently described to permit judgement of their appropriateness to the present study.	1 2 3 4 5 6 NA	

CATEGORY SCORE:

C. Design

CRITERIA	APPRAISAL RATING	COMMENTS
34. Design is appropriate to study questions and/or hypotheses.	1 2 3 4 5 6 NA	
35. Proper controls are included where appropriate.	1 2 3 4 5 6 NA	
36. Confounding/moderating variables are/can be identified.	1 2 3 4 5 6 NA	
37. Description of design is explicit enough to permit replication.	1 2 3 4 5 6 NA	

CATEGORY SCORE:

VI. DATA ANALYSIS

CRITERIA	APPRAISAL RATING	COMMENTS
38. Information presented is sufficient to answer research questions.	1 2 3 4 5 6 NA	
39. Statistical tests used are identified and obtained values are reported.	1 2 3 4 5 6 NA	
40. Reported statistics are appropriate for hypotheses/ research questions.	1 2 3 4 5 6 NA	
41. Tables and figures are presented in an easy-to-understand, informative way.	1 2 3 4 5 6 NA	

CATEGORY SCORE:

VII. DISCUSSION

CRITERIA	APPRAISAL RATING	COMMENTS
42. Conclusions are clearly stated.	1 2 3 4 5 6 NA	
43. Conclusions are substantiated by the evidence presented.	1 2 3 4 5 6 NA	
44. Methodological issues in study are identified and discussed.	1 2 3 4 5 6 NA	
45. Findings of study are specifically related to conceptual/theoretical basis of the study.	1 2 3 4 5 6 NA	
46. Implications of the findings are discussed.	1 2 3 4 5 6 NA	
47. Results are generalized only to population on which study is based.	1 2 3 4 5 6 NA	

CRITERIA	APPRAISAL RATING	COMMENTS
48. Recommendations are made for further research.	1 2 3 4 5 6 NA	
CATEGORY SCORE:		
VII. FORM & STYLE		
49. Report is clearly written.	1 2 3 4 5 6 NA	
50. Report is logically organized.	1 2 3 4 5 6 NA	
51. Tone of report displays an unbiased, impartial, scientific attitude.	1 2 3 4 5 6 NA	
CATEGORY SCORE:		

GRAND TOTAL:

ENTER GRAND TOTAL SCORE IN THE APPROPRIATE CATEGORY:

_____ SUPERIOR (205 - 306 POINTS)

_____ AVERAGE (103 - 204 POINTS)

_____ BELOW AVERAGE (0 - 102 POINTS)

FINAL SUMMARY OF MAJOR STRENGTHS
AND LIMITATIONS

STRENGTHS: LIMITATIONS:

APPENDIX E

Content Validation Worksheet for the "Research Classification Instrument"

CONTENT VALIDATION WORKSHEET

FOR THE NEPHROLOGY CLASSIFICATION INSTRUMENT

Definition of Study Population:
The study population consists of books, monographs, dissertations, or articles contained in a major journal; written in English; authored or co-authored by a nurse; used human subjects; and pertaining to the care of individuals with acute or chronic renal disease. Patient care is defined as including activities that involve assessment, intervention or interactions with a patient; with the objective of alleviating an actual or potential health problem. Master's theses will be included it they are readily available. For this study, publication will have occurred from 1990 through 1992.

1. CLINICAL AREA OF PRACTICE

OBJECTIVE: To assign each research item in the study a classification which reflects the general area of nephrology nursing practice addressed within the research.

ITEM: Clinical area of practice addressed by the research:

1. Hemodialysis
2. Peritoneal dialysis
3. Renal transplantation
4. End-stage renal disease in general
5. Acute renal failure in general

QUESTION: Given the population definition and your knowledge of nephrology nursing, please assign a value based upon the item's congruence with the objective.

_____+1 - the item is a definite measure of the objective

_____ 0 - undecided about whether the item is a measure of the objective.

_____ -1 - the item is not a measure of the objective.

COMMENTS: For a rating of 0 or -1 please comment about possible changes to the item to improve congruence with the objective.

2. RESEARCH DESIGN

OBJECTIVE: To assign each research item in the study a classification which reflects the design of the research.

ITEM: Research design: _____ Experimental design
_____ Survey design
_____ Exploratory-descriptive design
_____ Historical design
_____ Epidemiological design
_____ Methodological design
_____ Evaluative design

Experimental designs: Where the research is designed to test theory. This includes the experimental design where there is random assignment of subjects to groups, manipulation of independent variable(s), control of intervening variables, quantitative data collection, and data analysis which discriminates between and among experimental and control groups. Also included is the quasi-experimental design where random assignment of subjects does not occur (Brink & Wood, 1989, pp.. 19-20).

Survey designs: Where the research is designed to yield a statistical analysis of the relationships between and among variables. This includes comparative designs, where a cause-and-effect relationship is predicted, but there is no manipulation of the independent variable. This category also incudes correlational designs where there is no prediction of cause and effect (Brink & Wood, 1989, pp. 20-21).

Exploratory-descriptive designs: Descriptive designs are used to describe a single variable or population in a thorough manner. Usually involves both qualitative and quantitative data collection techniques. Exploratory designs are used to define concepts, describe processes or result in beginning theories. Usually have qualitative data collection (Brink & Wood, 1989, p. 21).

Historical designs: Are nonexperimental, based on available written data, artifacts, or oral histories. Usually qualitative data (Brink & Wood, 1989, p. 22).

Epidemiological designs: Document health, illness and disease patterns. Are usually correlational designs (Brink & Wood, 1989, p. 22).

Methodological designs: Used to develop and test data collection instruments (Brink & Wood, 1989, p.23).

Evaluative designs: Describe a change or manipulation and test the effect (Brink & Wood, 1989, pp. 22-23).

QUESTION: Please assign a value based upon the item's congruence with the objective.

_____ +1 - the item is a definite measure of the objective.
_____ 0 - undecided about whether the item is a measure of the objective.
_____ -1 - the item is not a measure of the objective.

COMMENTS: For a rating of 0 or -1 please comment about possible changes to the item to improve congruence with the objective.

3. MAJOR TOPIC OF THE RESEARCH

OBJECTIVE: To identify through content analysis, the topic(s) addressed by the research study.

DEFINITION: This is the specific area of inquiry of a research study; i.e. sleep disorder, blood pressure control, sexuality.

ITEM: What are the major topics of the research?

QUESTION: Please assign a value based upon the item's clarity and congruence of meaning with the variable definition.

_____ +1 - the item is definitely clear and congruent with the variable definition.

_____ 0 - undecided about whether the item is both clear and congruent.

_____ -1 - the item is neither clear nor congruent with the variable definition.

COMMENTS: For a rating of 0 or -1 please comment about possible changes to the item to improve clarity and congruence with the variable definition.

4. INDEPENDENT VARIABLE

OBJECTIVE: To identify through content analysis, any independent variables addressed by the research study.

DEFINITION: This is the manipulated or causative variable in a research study.

ITEM: List any independent variables.

QUESTION: Please assign a value based upon the item's clarity and congruence of meaning with the variable definition.
_____ +1 - the item is definitely clear and congruent with the variable definition.
_____ 0 - undecided about whether the item is both clear and congruent.
_____ -1 - the item is neither clear nor congruent with the variable definition.

COMMENTS: For a rating of 0 or -1 please comment about possible changes to the item to improve clarity and congruence with the variable definition.

5. DEPENDENT VARIABLE

OBJECTIVE: To identify through content analysis, the dependent variables in a research study.

DEFINITION: This is the outcome or measured variable in a research study.

ITEM: List all dependent variables.

QUESTION: Please assign a value based upon the item's clarity and congruence of meaning with the variable definition.
_____ +1 - the item is definitely clear and congruent with the variable definition.
_____ 0 - undecided about whether the item is both clear and congruent.
_____ -1 - the item is neither clear nor congruent with the variable definition.

COMMENTS: For a rating of 0 or -1 please comment about possible changes to the item to improve clarity and congruence with the variable definition.

NAME : ____________________________

DATE: ________________

APPENDIX F

Calculations for Instrument Reliability and Validity

Sample test result matrices, formulas for statistics, and sample calculation

Formulas for Validity and Reliability Statistics

1. P_o = the proportion of observed agreements in classifications on both occasions.

   Formula: $P_o = \sum_{k=1}^{m} P_{kk}$

   where m = the number of classification categories

   P_{kk} = the proportion of objects or persons consistently classified in the k^th category

2. P_c = the proportion of chance agreements.

   Formula: $P_c = \sum_{k=1}^{m} P_k P_k$

   where m = the number of classification categories

   $P_k P_k$ = the proportion of objects or persons assigned to category k on each measurement occasion, respectively

3. k = proportion of nonchance agreements.

   Formula: $k = \dfrac{P_o - P_c}{1 - P_c}$

4. k_{max} = the upper limit value that k could take on with the particular distribution of results.

   Calculation: a second test result matrix is produced for the data, where the values within the cells are adjusted to reflect the maximum number of possible agreements or consistent classifications that could be congruent with the observed marginal proportions, and by calculating a revised version of k using the adjusted values. Thus, calculate P_0, P_c, and k for the second matrix. The second k value = k_{max}.

5. k/ k_{max} ratio = a standardized value (upper limit is 1.0). The closer the ratio is to 1.0, the higher the degree of consistency of classifications between administrations of the instrument.

Formulas extracted from Waltz, Strickland, & Lenz (1991), pp. 230 - 234.

Sample Test Result Matrices and Reliability Statistics for

RCI Stability for the Variable "Research Design"

1. Result Matrix #1 - Displays distribution of agreements in classifications for the variable "Research Design". Matrix cells show both numbers of agreements and proportions.

	Second Adminsistration								
		1	2	3	4	5	6	7	Totals
First Administration	1	**1**/.025							**1**/.025
	2	**1**/.025	**5**/.125	**1**/.025					**7**/.175
	3	**1**/.025	**5**/.125	**4**/.10					**10**/.25
	4				**1**/.025				**1**/.025
	5		**2**/.05			**5**/.125			**7**/.175
	6								**0**
	7		**3**/.075	**2**/.05				**9**/.225	**14**/.35
	Totals	**3**/.075	**15**/ .375	**7**/.175	**1**/.025	**5**/.125	**0**	**9**/.225	**40**/ 1.00

where: 1 = experimental design
2 = survey design
3 = exploratory-descriptive design
4 = historical design
5 = epidemiological design
6 = methodological design
7 = evaluative design

2. Result Matrix #2 - Displays maximum number of possible agreements (for the variable "Research Design") that could be congruent with the observed marginal proportions found in Result Matrix #1. Highlighted boxes indicate where proportions were adjusted.

		Second Administration							
		1	2	3	4	5	6	7	Totals
First Administration	1	**1**/.025							**1**/.025
	2	**1**/.025	**6**/.150						**7**/.175
	3	**1**/.025	**4**/.100	**5**/.125					**10**/.25
	4				**1**/.025				**1**/.025
	5		**2**/.05			**5**/.125			**7**/.175
	6								**0**
	7		**3**/.075	**2**/.05				**9**/.225	**14**/.35
	Totals	**3**/.075	**15**/ .375	**7**/.175	**1**/.025	**5**/.125	**0**	**9**/.225	**40**/ 1.00

where: 1 = experimental design
2 = survey design
3 = exploratory-descriptive design
4 = historical design
5 = epidemiological design
6 = methodological design
7 = evaluative design

3. Calculations for P_o, P_c, k, and k/ k_{max} ratio.

P_o = proportion of observed agreements (from Result Matrix #1).
= .025 + .125 + .10 + .025 + .125 + .225 = .625

P_c = proportion of chance agreements (from Result Matrix #1).
= (.075 x .025) + (.375 x .175) + (.175 x .25) + (.025 x .025) + (.125 x .175) + (0 x 0) + (.225 x .35)
= .212

k = proportion of nonchance agreements (from Result Matrix #1).

$$= \frac{.625-.212}{1-.212}$$

= .52

k_{max} = upper limit value for k

= for Test Result Matrix #2

= 0.59

k/ k_{max} ratio = $\frac{0.52}{0.59}$ = 0.88

APPENDIX G

List of Publications in the Study Sample

LIST OF PUBLICATIONS IN STUDY SAMPLE

1 Abraham, G., Blake, P.G., Mathews, R.E., Bargman, J.M., Izatt, S., & Oreopoulos, D.G. (1990). Genital swelling as a surgical complication of continuous ambulatory peritoneal dialysis. Surgery, Gynecology & Obstetrics, 170(4), 306-308.

2 Abraham, P.A., Opsahi, J.A., Keshaviah, P.R., Collins, A.J., Whalen, J.J., Asinger, R.W., McLain, L.A., Hanson, G., Davis, M.G., & Halstenson, C.E. (1990). Body fluid spaces and blood pressure in hemodialysis patients during amelioration of anemia with erythropoietin. American Journal of Kidney Diseases, 16(5), 438-446.

3 Acchiardo, S.R., Hatten, K.W., Ruvinsky, M.J., Dyson, B., Fuller, J., & Moore, L.W. (1992). Inadequate dialysis increases gross mortality rate. ASAIO, 38(3), M282-M285.

4 Acchiardo, S.R., Moore, L.W., Sargent, J.A., & Burk, L.B. (1991). Is hematologic response to iron and erythropoietin in hemodialysis patients affected by other factors? ASAIO, 37(3), M183-M185.

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American Journal of Kidney Diseases, 17(3), 290-294.

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Journal of Kidney Diseases, 16(2), 137-141.

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APPENDIX H

Classifications and Quality Rating for Individual Publications

Classifications and Quality Rating for Individual Publications

Legend for Numerical Codings

1. Descriptors for Topic of Research and Variables

Number	Descriptor Category
1	Dialysis system/modality
2	Exit-site infections
3	Tunnel Infections
4	Peritonitis
5	Peritoneal Dialysis catheters
6	Peritoneal Dialysis complications
7	Peritoneal Equilibration Test (PET)
8	Hemodialysis access
9	Blood sampling
10	Recirculation
11	Central lines
12	Access complications
13	Access surgery
14	Hemodialysis complications
15	Adequacy of dialysis
16	Urea kinetic modeling
17	Dialysis prescription
18	Residual renal function
19	Change of dialysis modality
20	Continuous Arterio-Venous Hemofiltration (Dialysis) [CAVH(D)]
21	Renal transplant function
22	Cold ischemic time
23	Transplant rejection
24	Post Transplant Lymphoproliferative Disease (PTLD)
25	Biopsies
26	Pancreas/kidney transplant

27	Pediatrics
28	Geriatrics
29	Mortality/morbidity
30	Risk factors
31	Pain
32	Bacterial organisms
33	Cost of treatment
34	Socioeconomic status
35	Antibiotics
36	Erythropoietin
37	Immunosuppression
38	Heparin
39	Medication administration
40	Anticoagulation
41	Growth hormone
42	Blood transfusions
43	Phlebotomy
44	Cardiopulmonary resuscitation
45	Primary health care
46	Healthcare practices
47	Comorbid diseases/conditions
48	Anemia
49	Infection/sepsis
50	Blood pressure
51	Viral infections
52	Fluid gain
53	Nutritional parameters
54	Growth parameters
55	Iron overload
56	Sleep disorders
57	Neuropsychological function
58	Depression
59	Biochemical parameters
60	Hematological parameters
61	Immunologic parameters

62	Tissue typing parameters
63	Drug pharmacokinetics
64	Organ donation
65	Instrument evaluation/testing
66	Education
67	Physical/physiological parameters
68	Social functioning/parameters
69	Cognitive function
70	Rehabilitation
71	Recreation
72	Employment
73	Adaptation
74	Stress
75	Coping
76	Helplessness
77	Uncertainty
78	Expectations
79	Compliance
80	Self-esteem
81	Social support
82	Attitudes/beliefs
83	Quality of life
84	Lifestyle
85	Behavior modification
86	Illness experience
87	Mood state

2. Problem areas of research identified through low RAC scores for the category

1	Title
2	Abstract
3	Description of the problem
4	Literature Review
5	Subjects
6	Instruments
7	Research design
8	Data analysis
9	Discussion
10	Form and Style

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
1	Epidemiological	PD	6	-	6	Below Ave.	2, 3, 4, 5, 6, 7, 8
2	Evaluative	HD	36, 50	36	59, 67	Average	4, 5, 6
3	Epidemiological	HD	29	15	29	Average	5, 6
4	Survey	HD	36, 48	-	36, 39, 53, 60	Average	
5	Epidemiological	HD	29	-	29, 53, 59	Average	4, 5, 6
6	Evaluative	HD	36, 48	48	53, 59, 60	Average	3, 4, 5, 6
7	Evaluative	HD	6	17	29	Average	4, 5, 6, 7
8	Evaluative	PD	1	-	4, 73	Below Ave.	2, 3, 4, 5, 6, 7, 8, 9, 10
9	Evaluative	PD	15	7	15	Average	3, 4, 5, 6, 8
10	Evaluative	PD	35	35	29, 32, 63	Average	2, 3, 4, 5, 6
11	Epidemiological	Transplant	24	37, 51, 62	24, 29	Average	4, 6
12	Epidemiological	PD	28	-	2, 4, 29, 30	Average	2, 4, 6
13	Evaluative	HD	36, 38	36	38, 60	Average	5, 6
14	Evaluative	PD	1	1	1	Average	5, 6
15	Evaluative	HD	35, 63	35	18, 59, 63	Average	2, 3, 5, 6
16	Evaluative	HD	36, 48	36	12, 14, 42, 50, 60	Average	3, 5, 6
17	Explor.-Descr.	HD	68	-	60, 66, 72, 79, 80		5, 6
18	Evaluative	HD	36	39	59, 60	Average	6
19	Evaluative	Transplant	27, 41	41	54	Average	6

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
20	Evaluative	PD	59	1	59	Average	5, 6
21	Epidemiological	PD	6, 49	-	1, 5, 32, 49	Average	4, 5, 6
22	Evaluative	HD	9, 40	9	38, 60	Average	4, 5, 6
23	Survey	Transplant	64	-	64	Average	2, 4, 5, 6
24	Survey	PD	15	15	29, 59	Average	5, 6
25	Evaluative	ARF	20	17	50, 59	Average	5, 6, 10
26	Epidemiological	ARF	20	-	29, 50, 59, 67	Average	2, 4, 6
27	Survey	HD	73	-	66, 75, 77	Average	2, 5
28	Evaluative	PD	4	35	4, 32	Average	3, 4, 5, 6
29	Survey	HD	47	-	15, 47, 59	Average	4, 5, 6
30	Epidemiological	HD	29	-	29, 59	Average	2, 5, 6
31	Survey	HD	69	-	17, 69	Average	5, 6
32	Evaluative	HD	57, 83	17	14, 57, 83	Average	6
33	Methodological	HD	15, 65	17	15, 65	Average	5
34	Epidemiological	HD	29, 30	-	15, 29, 47	Average	6
35	Survey	HD	60	-	42, 60	Average	5, 6
36	Survey	HD	47, 48	47	59, 60	Average	3, 4, 5, 6
37	Evaluative	PD	4	1	4	Average	5, 6, 7
38	Survey	PD	61	-	4, 59, 60, 61	Average	4, 5, 6
39	Epidemiological	PD	2, 30	1, 5	2	Average	6
40	Evaluative	HD	60	-	42, 60	Average	4, 5

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
41	Epidemiological	ESRD	39	39	33, 49, 51, 72	Below Ave.	2, 3, 4, 5, 6, 9
42	Evaluative	PD	1, 28	1	19, 30, 67	Average	2, 3, 4, 5, 6, 7
43	Explor.-Descr.	ARF	20, 27	-	59, 67	Average	3, 4, 5, 6
44	Evaluative	ESRD	13	-	13, 29, 49	Average	4, 5, 6
45	Evaluative	PD	53	39	50, 59, 60, 67	Average	5, 6, 7
46	Evaluative	PD	4	39	6	Average	3, 5, 6, 8
47	Epidemiological	PD	4,6	-	4, 6	Average	4, 5, 6
48	Evaluative	PD	1, 27	1	15, 82	Average	4, 5, 6
49	Evaluative	HD	36, 48	36	42, 60	Average	4, 5, 6, 7
50	Evaluative	HD	17	17	14, 16, 29, 50, 52, 59	Average	1, 4, 6
51	Evaluative	Transplant	36	36	21, 50, 60	Average	2, 3, 5, 6, 7, 8
52	Epidemiological	Transplant	27	-	22, 37, 62, 79	Average	5, 6
53	Evaluative	HD	8	11	12, 40	Average	2, 4, 5, 6, 10
54	Methodological	HD	65	-	65	Superior	3
55	Epidemiological	PD	29	-	6, 47, 66	Average	3, 4, 5, 6
56	Evaluative	Transplant	37	39	21, 37, 63, 67	Average	3, 4, 5, 6
57	Evaluative	Transplant	37	39	61, 67	Average	5, 6
58	Explor.-Descr.	ESRD	73	1	75		
59	Evaluative	PD	1	-	1, 59, 73	Average	3, 5, 6
60	Evaluative	PD	1, 27	1	15	Average	3, 5, 6
61	Evaluative	PD	1	1	4, 32	Below Ave.	3, 4, 5, 6, 7, 9, 10

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
62	Explor.-Descr.	Transplant	74	-	74	Average	5
63	Evaluative	PD	2	5	2	Average	4, 5, 6
64	Evaluative	Transplant	26, 67	26	67	Average	2, 5, 6
65	Evaluative	Transplant	67	47	67	Average	5, 6
66	Survey	Transplant	23	-	22, 25, 29, 61, 67	Average	5, 6
67	Survey	Transplant	70	-	67	Average	none
68	Explor.-Descr.	ESRD	27, 86	-	86		
69	Evaluative	HD	8	8	12	Average	3, 6
70	Survey	PD	47	-	47, 59	Average	4, 5, 6, 7
71	Survey	HD	38	-	38, 59	Average	5, 6
72	Evaluative	HD	27, 38	-	14, 59, 60	Average	3, 4, 5
73	Survey	PD	2	-	2, 5, 6, 59	Average	4, 5, 6
74	Survey	HD	16	-	16, 17, 53	Average	4, 6
75	Epidemiological	PD	6	-	6	Average	3, 4, 5, 6, 7, 9
76	Evaluative	Transplant	61	-	61	Average	5, 6
77	Explor.-Descr.	Transplant	83	-	66, 78, 82	Average	5
78	Explor.-Descr.	Transplant	83	-	83	Average	2, 5
79	Evaluative	ARF	37	37	23, 29, 62	Average	5, 6, 7
80	Evaluative	HD	10	10	10	Average	4, 5, 6
81	Evaluative	HD	8, 10	-	10	Average	4, 5
82	Epidemiological	Transplant	29	-	29, 47	Average	5, 6

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
83	Epidemiological	PD	6	-	5, 32, 35	Average	4, 6
84	Epidemiological	PD	2, 4	1	2, 4	Average	4, 5, 6
85	Epidemiological	PD	3, 30	-	3, 6, 32, 47	Average	4, 5, 6
86	Epidemiological	PD	4	-	3, 4	Average	3, 4, 6
87	Survey	ESRD	56	-	16, 18, 56	Average	5, 6
88	Epidemiological	PD	6	47	2, 4, 5, 32	Average	4, 5, 6
89	Survey	PD	60	4	60	Average	5, 6
90	Explor.-Descr.	HD	83	-	47, 83	Average	4, 5, 6
91	Epidemiological	PD	4	1	4, 32	Average	4, 5, 6, 9
92	Evaluative	Transplant	37	37	59	Below Ave.	2, 3, 4, 5, 6, 10
93	Evaluative	Transplant	26, 37	37	59	Average	5, 6, 7
94	Evaluative	Transplant	37	37, 67	21, 50	Average	6
95	Evaluative	Transplant	37	-	23, 37, 62, 67	Average	5, 6, 7
96	Evaluative	Transplant	59	26	59	Below Ave.	2, 3, 4, 5, 6, 7, 8
97	Epidemiological	HD	29	-	30, 47, 50	Average	3, 4, 5, 6
98	Explor.-Descr.	PD	36	-	36, 60	Average	5, 6
99	Epidemiological	PD	6, 28	-	6, 29, 47, 59, 84	Average	3, 4, 5, 6
100	Evaluative	Transplant	21	-	21	Average	5, 6, 7
101	Epidemiological	HD	68	-	29, 30, 68	Average	2, 4, 5, 6
102	Epidemiological	HD	30	-	14, 17, 47, 67, 68, 79	Average	5, 6

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
103	Epidemiological	HD	30	-	14, 17, 47, 67, 69, 79	Average	5, 6, 7
104	Survey	PD	15, 16	-	16, 53, 59	Average	2, 4, 5, 6
105	Evaluative	ESRD	27, 71	71	82		
106	Explor.-Descr.	HD	87	-	14, 87		
107	Evaluative	PD	6	47	6	Average	6
108	Evaluative	PD	36	60	59	Average	4, 5, 6
109	Evaluative	HD	36, 55	36, 43	60	Average	3, 6
110	Evaluative	HD	8, 36	36	12	Average	5, 6, 7, 8
111	Evaluative	Transplant	27, 37	37	23, 29, 59	Average	5, 6, 7, 9
112	Evaluative	Transplant	23, 27	37	59, 63	Below Ave.	3, 4, 5, 6, 7, 9
113	Evaluative	HD	11, 49	11, 32	49	Average	4, 5, 6
114	Epidemiological	PD	2, 27	-	1, 2, 5	Average	3, 4, 5, 6
115	Epidemiological	PD	4,27	-	2, 4, 49, 59, 60, 68	Average	3, 4, 5, 6, 7
116	Evaluative	HD	79	66	73	Average	4, 5, 6, 7, 9
117	Explor.-Descr.	PD	60	-	60	Average	3, 4, 5, 6
118	Survey	PD	60	-	6, 60	Average	5, 6
119	Evaluative	PD	66	66, 69, 87	66, 73	Average	5, 6
120	Survey	ESRD	18	-	1, 18	Average	5, 6
121	Evaluative	PD	39	39	59	Average	5, 6
122	Explor.-Descr.	ESRD	86	-	86		

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
123	Evaluative	HD	8	39	31	Average	4, 5, 6, 7
124	Evaluative	ARF	20, 40	40	15, 20	Average	2, 6
125	Epidemiological	Transplant	27, 49	67	49	Average	4, 5, 6
126	Explor.-Descr.	HD	83	-	83		
127	Survey	HD	83	-	83	Average	2, 5, 6
128	Explor.-Descr.	PD	29	-	30	Below Ave.	2, 3, 4, 5, 6, 7, 9, 10
129	Evaluative	PD	5	5	5	Average	5, 6
130	Epidemiological	HD	8	-	12	Below Ave.	2, 3, 4, 5, 6, 7, 9, 10
131	Explor.-Descr.	HD	45	-	45, 46, 47	Average	4, 5, 6
132	Evaluative	PD	35	35	67	Average	5, 6
133	Evaluative	HD	36	36	39, 60	Average	3, 4, 6
134	Epidemiological	PD	28	-	46, 19, 29	Average	5, 6, 7, 9
135	Survey	PD	15	-	15, 16, 53	Average	3, 4, 5, 6
136	Survey	PD	18	-	18, 60	Average	4, 5, 6
137	Evaluative	PD	17	17	59	Average	6
138	Epidemiological	Transplant	29	-	23, 29, 37, 59, 62	Below Ave.	2, 3, 4, 5, 6
139	Evaluative	HD	36, 38	36	38, 60	Average	2, 3, 5, 6, 7
140	Explor.-Descr.	ESRD	27, 75	-	75		
141	Survey	HD	79	-	79, 81	Average	5
142	Evaluative	Transplant	23, 27	39	21, 61	Average	4, 5, 6, 9
143	Evaluative	PD	4	17	4, 32	Average	5, 6

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
144	Survey	PD	1	-	1, 59	Average	5, 6
145	Evaluative	PD	6	1	2, 4, 32	Average	4, 6
146	Survey	PD	6	67	6	Average	4, 6
147	Evaluative	Transplant	37	39	21, 50	Average	1, 6
148	Survey	PD	53, 79	-	53	Average	1, 4, 5, 6
149	Evaluative	HD	8	-	12, 13	Below Ave.	3, 4, 5, 6, 7, 8
150	Explor.-Descr.	HD	44	-	29, 44, 82	Average	2, 5, 6
151	Evaluative	PD	4	1	4	Average	4, 5, 6
152	Evaluative	PD	15, 36	36	15, 59, 60	Below Ave.	4, 5, 6, 9, 10
153	Survey	ESRD	74	-	47, 58, 74, 81	Average	5
154	Survey	HD	44	-	30, 44, 67, 68, 82	Average	4, 5, 6, 7
155	Epidemiological	PD	29, 49	-	6, 29, 49	Average	3, 4, 5, 6
156	Evaluative	PD	36	36	42, 59, 60	Average	3, 5, 6, 9
157	Survey	ESRD	70	-	1, 47, 66, 67, 70	Average	3, 4, 5, 6, 7
158	Epidemiological	PD	4	1	3, 4, 32	Average	3, 4, 6
159	Survey	Transplant	83	-	72, 83	Average	5, 6
160	Survey	ESRD	76	-	1, 76	Average	none
161	Epidemiological	PD	29	-	4, 29, 32, 79	Below Ave.	2, 3, 4, 5, 6, 7
162	Experimental	PD	63	39	59	Average	4, 5, 6
163	Survey	Transplant	27, 29	67	29, 34, 62	Average	3, 4, 5, 6

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
164	Explor.-Descr.	Transplant	27, 86	-	86		
165	Evaluative	PD	39	39	15, 18, 59	Average	4, 5
166	Evaluative	PD	67	39	59	Average	5, 6
167	Evaluative	PD	5	5	6	Average	6
168	Survey	PD	4	39	60	Average	6
169	Survey	ARF	35	1	63	Average	2, 3, 4, 5, 6
170	Explor.-Descr.	PD	50	39	50, 63	Average	5, 6
171	Evaluative	PD	5	5	5, 6	Average	3, 6
172	Evaluative	PD	49	35	2, 4, 32	Average	3, 6
173	Evaluative	PD	49	35	49	Average	6
174	Explor.-Descr.	HD	70, 83	-	84	Average	2, 6
175	Evaluative	Transplant	66	66	82	Below Ave.	2, 3, 4, 5, 6, 7
176	Evaluative	PD	5	5	6	Average	3, 4, 5, 6
177	Evaluative	PD	5	5	6	Average	1, 2, 3, 4, 5, 6, 10
178	Evaluative	PD	1	1	15, 59	Average	5, 6
179	Epidemiological	PD	6	-	6	Average	3, 4, 5, 6, 7
180	Epidemiological	PD	6	-	5	Average	6
181	Epidemiological	ESRD	67	-	59, 67	Average	4, 6
182	Epidemiological	PD	28, 47	30	6, 29	Average	5, 6
183	Survey	PD	44	-	29, 34, 44, 47, 82	Average	4, 5, 6
184	Evaluative	HD	79	66	52, 79	Average	2, 5, 6, 7

ARTICLE #	RESEARCH DESIGN	CLINICAL AREA	TOPIC OF RESEARCH	INDEPENDENT VARIABLES	DEPENDENT VARIABLES	QUALITY OF RESEARCH	IDENTIFIED PROBLEMS
185	Explor.-Descr.	Transplant	74, 83	-	74, 75, 83	Average	2, 5, 6
186	Evaluative	PD	27, 59	39	59	Average	5, 6
187	Evaluative	HD	32	39	32	Average	5, 6, 7
188	Epidemiological	ESRD	29	-	47, 50, 67	Average	3, 4, 5, 6
189	Epidemiological	Transplant	29	-	62	Below Ave.	2, 5, 6, 7, 8
190	Survey	Transplant	74, 83	-	74, 75, 83	Average	none
191	Evaluative	HD	27, 79	85	79	Average	4, 5, 6, 7, 8
192	Epidemiological	PD	29	-	29	Below Ave.	2, 3, 4, 5, 6, 7, 10
193	Survey	PD	53	-	18, 53, 67	Average	6
194	Evaluative	PD	35	35	2, 29	Average	5, 6